SYNOPSYS

SUBMITTED BY

Sandeep Kudtarkar

Student ID: 80121150004

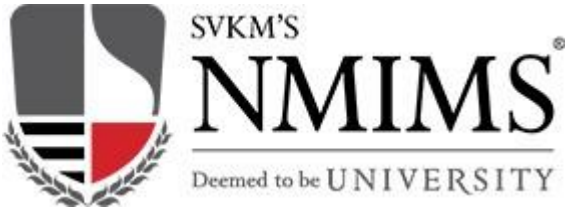
TITLE: Critical Analysis of PPP model in infrastructure sector in India

Thesis Advisory Committee

Dr. Anupam Rastogi, *Narsee Monjee Institute of Management Studies (NMIMS), Mumbai*

Dr. Mayank Joshipura, *Narsee Monjee Institute of Management Studies (NMIMS), Mumbai*

Dr. M.K. Satish, *Narsee Monjee Institute of Management Studies (NMIMS), Mumbai*



School of Business Management

Mumbai – 400 056

September 2022

DECLARATION

I hereby declare that the research work embodied in the present thesis entitled **Critical Analysis of PPP model in infrastructure sector in India** is the outcome of my own efforts except for the guidance received from the Thesis Advisory Committee and the references to the earlier works that have been duly acknowledged. I further declare that this work has not been submitted to this University or any other university for any other exam.

Place: **Mumbai** **(Signature of Research Student)**

Date:

CERTIFICATE BY THE THESIS ADVISORY COMMITTEE

This is to certify that the Thesis entitled **Critical Analysis of PPP model in infrastructure sector in India** embodies the work of the candidate himself. The candidate has worked under our guidance and in our opinion the Thesis fulfills the requirements of SVKM's NMIMS University, Mumbai relating to Degree of Ph. D. (Management Studies).

Members of TAC

		Name	Signature
1.	Chairman	Dr. Anupam Rastogi	_____
2.	Member	Dr.Mayank Joshipura	_____
3.	Member	Dr.M.K Satish	_____

-

Place: **Mumbai**

Date

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My pursuit of PhD has been a journey which has contributed to enhancement of my knowledge and research aptitude. The five years of this fascinating voyage was possible because of people who supported me for all my academic and professional endeavours. Every generation which is able to lead a contented and peaceful life must remain indebted to its previous generations which made sacrifices to make it possible.

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PREFACE

An educational background in engineering and finance management and industry experience of more than 20 years motivated me to explore the nuances of Infrastructure sector to a greater extent. The operational aspects of project managment had always fascinated me in terms of the potential that this industry had in reshaping the contours of National economy. At the same time, the opportunity to serve a larger social good through advanced use of project management technology and financial aspects of project management inspired me to pursue research in the area of Infrastructure development through Public Private Partnership (PPP) model.

The primary idea of a research topic which would justify the utilization of my education and experience and produce an outcome for building the world class infrastructure in India formed the first level of discussions for this study. With more discussions with peers in the industry and academic experts in the field of management, I realized that the proposed study must have a theoretical grounding in academic literature and also appeal to the infrastructure construction industry for practical applications. Considering the need to build the best public infrastructure in the country which can contribute positively to GDP of the country, this research study focussed on how high quality and cost effective infrastructure can be built providing best services to citizens and boosting their quality of life.

PPP model in infrastructure is essential considering the impact of overall slow down in Indian economy in last decade and the big blow to economy due to Covid-19 pandemic. This study attempted to investigate the causes for the disappointing performance of PPP model in the last decade and suggest a framework to revisit and revitalize PPP model in India. During the course of the study, certain challenges also emerged for the data collection due to private nature of project SPVs. However, these challenges were handled with assistance from various databases and industry acquaintances and the study was completed within the defined time frame.

ABSTRACT

Considering the need to build the best public infrastructure in the country which can contribute positively to the GDP of the country, this research study focused on how high-quality and cost-effective infrastructure can be built providing the best services to citizens and boosting their quality of life. The PPP model in infrastructure is essential considering the impact of the overall slowdown in the Indian economy in the last decade and the big blow to the economy due to the Covid-19 pandemic. This study attempted to investigate the causes for the disappointing performance of the PPP model in the last decade and suggest measures to restructure the PPP model in India.

The prime focus of the PPP program in India was getting efficiency gains and capital from the private players. The government of India set up the PPP framework in India and by 2011, India was the second largest country in terms of initiating PPP projects. After 2011, the number of PPP projects started declining due to lackluster responses from the developers and investors. The PPP program in India was moderately successful in achieving the desired objectives and narrowing the infrastructure gap. The benefits would have been even more substantial if the PPP program had been better planned and executed and some undesirable effects would have been averted. The disappointing financial returns to the private developers and investors have emerged as the most significant reason for the PPP in India coming to standstill by end of 2019, ahead of emergence of the Covid-19 pandemic.

The failure to incorporate policies to mitigate various issues during the design, construction, and operational phase in the PPP contract, poor contract management, and lack of dispute redresser mechanism, regulatory issues, ineffectual risk allocation among partners, unbalanced contract design, and inefficient execution of contract leads to failure of PPP model In India. The performance of the PPP structure in the infrastructure sector in India in terms of contract management was disappointing mainly due to weak legal, policy, and regulatory framework.

Forming balanced contracts with an equitable and optimum risk allocation between the partners, incorporating flexibility to address changing macroeconomic and market conditions and enforcement of contract through an efficient institutional, contractual and legal framework , addressing issues of moral hazard, adverse selection , and opportunism due to inherent incomplete nature of PPP contracts through sound contract management and creating optimum risk-adjusted financial returns to the private partner and Value for Money (VfM) for the government will make future PPP successful. For the next generation of PPP projects, these lessons need to be examined and the suggestions to be incorporated.

Keywords: Public Private Partnership, Contract Management, Risk Management, Institutional Mechanism, Value for money, Public infrastructure, Risk adjusted financial returns, NPV, IRR. Termination, Project Management, Project Finanace

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LIST OF ABBREVIATIONS

1	AAI	-	Airport Authority of India
2.	PPP	-	Public Private Partnership
3.	NHAI	-	National Highway Authority of India
4.	AAI	-	Airport authority of India
5.	GOI	-	Government of India
6.	GDP	-	Gross Domestic Product
7.	DBFOM	-	Design-Build-Finance-Operate and maintain
8.	VFM	-	Value for Money
9.	HAM	-	Hybrid Annuity Model
10.	TOT	-	Toll Operate Transfer
11	NHAI	-	National Highway Authority of India
12	SPV	-	Special Purpose Vehicle
13	BOT	-	Built-Operate –Transfer
14	BOOT	-	Built-Own-Operate –Transfer
15	PFI	-	Private Finance Initiative
16	EPC	-	Engineering Procurement & Construction
17	NPV	-	Net Present Value
18	IRR	-	Internal Rate of return

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Chapter 1

Introduction

Introduction

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1.1 Introduction

The physical public infrastructure like roads and highways, thermal and renewable power, telecommunications, sea and airport, waterworks, waste management, urban mass transit and social infrastructure embrace healthcare, educational and other primary services are significant for the growth of national economy and improving quality of life of citizens. The Infrastructure accelerate development of the nation and enhance productivity by minimizing overall cost. A well panned infrastructure improves quality of life of citizens by efficiently furnishing essential services and assisting manufacturing sector to improve productivity.

Public Private Partnership (PPP) is mode of executing government public infrastructure projects in association with the private partner to build public infrastructure. PPP facilitates the private sector to fund, design, construct and operate public infrastructure.PPP entails a long term contract of 20, 30 or 50 years or longer. The revenue for the projects comes from toll, annuities and government subsidies from which the operating, maintenance and debt service expenses expenses can be met. The risk in the project is shared by the partners.

Completing the project on time and within the allocated budget is the responsibility of the private partner. The partner who is in the best position to manage the risk is assigned the risk.In the case of Design-Build-Finance-Operate and Maintenance contracts, the financial, revenue

,and technology risk is passed on to the private party and the regulatory and political risk is handled by the authority. The optimum allocation of risk is pivotal in achieving better value for money (VfM) in erecting better public infrastructure.

A sound economy and robust and stable institutional and regulatory setup are imperative for attracting private participation in setting up public infrastructure in PPP mode. Private investment can be attracted by instilling confidence in investors through economic stability in the country maintaining a stable environment in which both local and foreign investors can operate with limited risk in unpredictable circumstances with assured fair financial returns for the investors while building better quality physical infrastructure at a reasonable cost.

1.2 Public-Private Partnership (PPP)

In PPP mode, Infrastructure projects are built through the government and private partnership. For providing a public service by a private firm, it is required to be authorized to do so by the competent government authority. Through PPP concession a project company or consortium is authorized to construct, operate and maintain the public infrastructure and collect revenue for the rendered service by charging the users for its use.

In PPP mode, the private developer is delegated the responsibility of either financing, designing, constructing, or operating the infrastructure facility. The contract is the basis of the relationship between the private and government partner. Assigning a larger set of tasks to the private sector selected through the competitive bidding, encourages the private developer to minimize costs and innovate new models of infrastructure development.

The PPP modality has advantages vis-à-vis the public procurement such as total cost optimization by implementing a life cycle method due to the expertise and technical know-how of the private developer, through the **o**ptimal risk allocation between the government and private partner. The private developer is incentivized through the provision of quality performance, availability, or user -related bonus/penalty- based compensation.

The improper allocation of risks results in public harm than benefit. The citizens who are the end users of the facility bear the cost and subsidies paid for the project. There is no incentive for the private party to take a risk. In case of failure of PPP projects, the government has to take charge of the project and bear all the risks as the ultimate responsibility of providing the services lies with the government.

1.3 PPP Structure

Figure 1.1 exhibits the PPP project structure. The equity is infused by the project sponsor. The revenue comes either form end user in form of a toll or the government in the form of an annuity. The structure depicts the contractual and financial relations among the stakeholders for the entire contracted tenure of the project. The PPP contract /Concession agreement signed by the government authority and the private partner is at the heart of the structure. Based on the contractual terms agreed in the contract, the author controls the private partner’s assigned task of constructing and managing the infrastructure.

The PPP contract defines the scope, responsibilities of the partners, risks involved, and the payment mechanism. A developer selected through a competitive bidding process forms a Special Purpose Vehicle (SPV) to execute the project. The authority signs the concession with the SPV of the project. The SPV signs subcontract with shareholders, subcontractors for EPC and maintenance .The contractor and financial investors become shareholders in the SPV.

The obligations of the private partner:

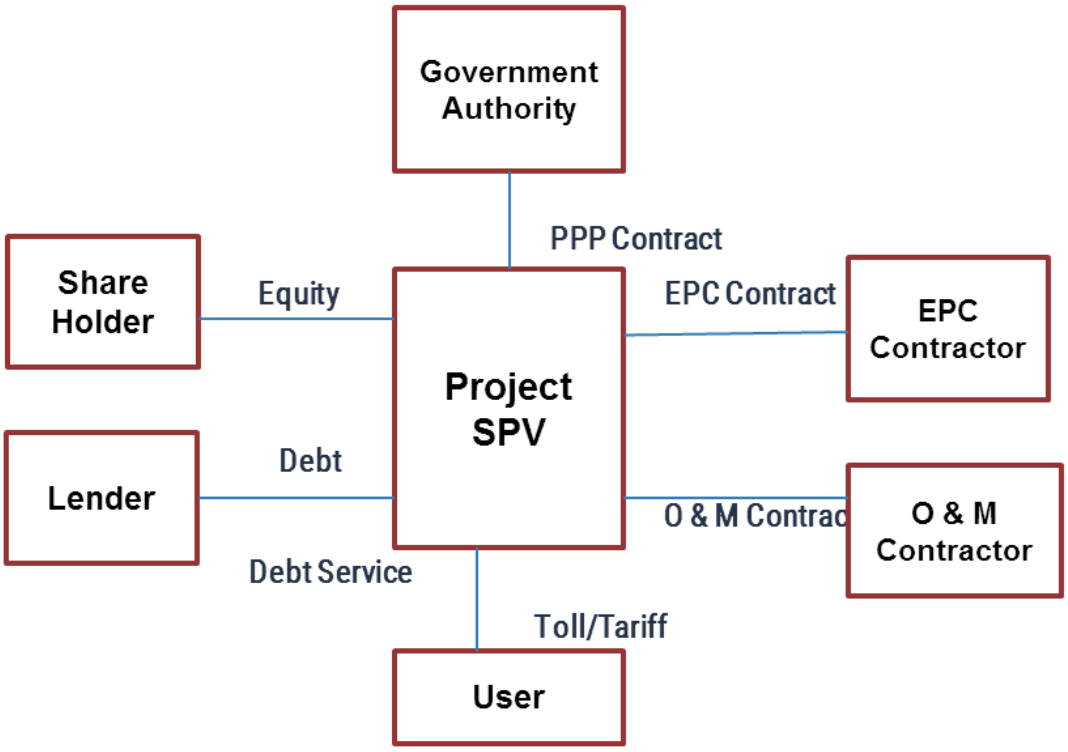
• Design and construction of the infrastructure

• Financing, Operation, and maintenance of the project during contract tenure

The SPV signs the shareholder agreement with investors and the loan agreement with the bank/lender. This process is called financial closure. The SPV pays the civil subcontractors through these funds. The authority arranges the land and various permissions including environmental for the project. The independent engineer appointed by the lender/authority inspects the construction work and submit the reports. The payment is released after the satisfactory report is received from the independent engineer.

Once the project is commissioned, the operation and maintenance phase starts. In this phase, the SPV collects the revenue from the end user of the facility in the form of fees or toll. The SPV pays the maintenance contractor from this revenue. The SPV incurs the operating expenses, pay the interest on debt and taxes and distributes the dividend to the investors.

Fig 1.1 PPP Structure



PPP Concession

The PPP concession defines the rights and responsibilities, risk allocation, and creating a framework to deal with the contingencies and changing circumstances in the life span of the project ranging from 10 to 30 years. The project tenure can be long enough for optimization of the project cost on a life costing basis. The fulfillment of contractual obligations by both the parties and financial viability and bankability of the project is essential for the project's success.

The time, resources, approval from higher authorities, and expert consultation is required for preparing the first draft of the PPP contract. This draft is included in the Request for proposal (RFP) documents and negotiations are done with prospective bidders on contractual terms. A PPP contract should be clear, intelligible, and comprehensible leaving no room for any ambiguity or uncertainty. Since every contingency cannot be anticipated and included in the contract, the contract must be flexible to deal with future events and conflicts to avoid renegotiations or litigations. If possible the future project manager can be included in the contract- forming process for effective contract management.

1.4 Global Trends in PPP

Table 1.1: Regional numbers of PPP projects 1990-2016 (World Bank report 2017)

Regional numbers of PPP projects 1990-2016		
Region	**Number of Projects**	**Total Investment (Billion $)**
East Asia and the Pacific	2062	4,48,007
Europe and Central Asia	923	4,34,462
Latin America and the Caribbean	2212	10,09,010
Middle East and North Africa	179	1,14,720
South Asia	1695	4,03,682
Sub-Saharan Africa	562	1,75,152
Total	7633	1,75,152

Source: World Bank report 2017

PPP projects differ in county according to the country's requirement. Political and economic atmosphere, development trends, and sectorial needs in the country. The World Bank statistics as shown in table 1.1 exhibits that the Latin America and the Caribbean area is a leader in terms of the number of projects and amount of investment. Brazil is the top contributor and influencer in Latin America, also 20% of the whole investment is being obtained. There are different kinds of PPP Models like BOT, BOO, DBOM and DBOI used according to the specific nature of a country's requirements. These models diverge in terms of tendering and procurement, tenure, risk allocation, and nature of contracts

1.5 Overview of Public Infrastructure in India

1.5.1 Transportation

The transport sector comprises roads, highways, rail, sea, and airport that expedite the movement of people and goods and boost growth and productivity in the economy, and facilitates social integration through the movement of people. The transport sector is vital for the Indian economy and is highly overburdened and facing various challenges such as congestion and shortage of capacity.

The issues in the Indian transportation system discussed in 12 th five year plan

1. The demand for commodities is increasing putting pressure on existing transportation infrastructure and heavy investment is required in rail networks.

2. The rail and shipping costs is higher in India due to inadequate, inefficient, and outdated technology infrastructure while average speed is lower than many countries.

3. 55% of the total goods are transported by road and only 35% by rail. To increase the speed and reduce the cost the modal switch from road to rail and waterways is required for the transportation of commodities.

4. Encouraging rail and shipping transport is essential for environmental sustainability by slashing the consumption of fossil fuels in road transportation.

5. The large area in India especially the North-East states in India has very little access to the network and needs to be integrated with the rest of India.

6. Over two lakh people die annually in road and rail accidents raising safety concerns and need for immediate improvements in safety measures.

7. An integrated regulatory system is required to regulate cost, tariff setting, unfair practices, and accountability towards consumers.

8. The overlapping of power between the Central and the State Governments creating conflicts should be examined in the context of laws, policies, and regulations.

The issues in the Indian Transportation system discussed by NITI AYOG

1. The lack of a holistic approach in terms of connectivity and synergies and weak intermodal connectivity in the transport sector creates inefficiency in the movement of people and goods.

2. The poor maintenance practices in the road sector and non-uniform standards leads to poor outcome.

3. Poor infrastructure results in congestion on roads and rails.

4. The transport network has modal imbalances where rail and waterways are underutilized and roads are overburdened.

5. A large number of deaths due to poor road safety resulted in a loss of 3% of India's GDP.

Initiatives proposed to address these issues in the 12th five -year plan

The transport sector issues need to be addressed in a holistically with appropriate reforms in terms of policies, laws, and regulations.

1. An efficient integration of the transport sector with a proper modal mix to increase productivity, efficiency, safety, and sustainability of the sector.

2. The investment decision in various modes such as highways, rail freight corridors, bullet trains, and waterways should be taken in a comprehensively to attain the objective of high speed, low cost ,and environmental sustainability.

3. The share of container transport is required to expand along with the development of ICDs.

4. India's 15000 kilometers long cost should be utilized by developing inland waterways and coastal terminals at seaports and creating interconnectivity between coastal and rail networks.

5. A larger and more focused investment is required to improve efficiency of the transportation.

6. A strategy is required for facilitating the capacity expansion of railways in terms of freight and passenger traffic as done in China for economic growth of 8 to 10%.

7. Due to budgetary constraints, private investments through the PPP route should be invited and expanded in the rail and waterways sector.

8. The share of private investment in infrastructure needs to increase from the current 40 % to 60%.

9. Reforms are required in the pricing of transport services. A careful review is required to complete viable projects and cancels economically unviable projects to utilize scarce financial resources carefully and proper incentives should be given to low- cost coastal shipping.

10. Transport safety is an area requiring immediate attention by making appropriate safety policies, legislation, regulations, and technologies and their efficient monitoring at Centre, state, and city levels.

12. Measures are required to take care of passenger safety, carbon emission reductions, energy efficiency, climate change, and social equity.

Suggestions by NITI AYOG

1. Building of multi- modal logistics parks around existing industrial clusters as a part of an integrated logistic framework as logistics efficiency improves India's logistic performance and export competitiveness.

2 A cargo database should be developed for the shipping sector. For road and highways FASTg technology is used for addressing congestion at toll plazas.

3. Improving connectivity with neighboring countries in South Asia and on international borders.

4. Increasing the investment from the privat sector , increasing the institutional and technical capacity of the government agencies awarding PPP projects, putting in place standard regulations, dispute resolution systems, international best practices, taxation reforms such as GST, innovative ways of institutional financing such as National Investment and Infrastructure Fund (NIIF), Infrastructure Investment Trusts.

Road sector

In India, the share of passenger traffic by road is 85% and the share of freight traffic by road is 60%. India has a road network of six lac kilometers with a density of 1.8 k of roads per sq.km and 5 km per 1000 population which is the second largest road network globally after the USA. The Indian road network is a mix of highways and narrow unpaved ways.

India has a network of 30,000 kilometers of 4 and 6-lane highways, total of 1.2 lac km of highways ,and expressways and one lac km of state highways connecting major manufacturing,

commercial and cultural centers in the country. The investment in national highways has increased from ₹15,000 crores in 2005-06 to ₹ one lac crore in 2015-16. Indian road program has attracted part many international contractors and consultants from the USA, Malaysia, South Korea, and Britain. The length of the road network is 55lac km including 34 lac km of rural roads, five lac km of urban roads, 11 lac km of PWD roads and 1.5 km state highways. Only 25% of highways have four or more lanes.

National Highway Authority of India (NHAI)

NHAI is executing body under the ministry of road and highways for the evelopment of highways in India which is currently managing 50,000 km long highways in India.NHAI's board consists of the chairman and five- full time directors including the secretary-planning commission, secretary-road transport and highways, and secretary-ministry of finance-expenditure.

National Highway Development Program (NHDP)

i) Golden Quadrilateral: Largest highway project in India and 5th largest in the world. It was started in 2001 (the first phase of NHDP) and completed in 2012. Total length of the project was 5846 km with 4/6 lane highways/expressways with a total cost of 60000 cr.

ii) North- South and East -West corridor: It was the second phase of NHDP with a total length of 7142 km with 4/6 lanes costing 12bn$.

iii) LWE (Left wing extremism): A special program for the maintenance of roads in tribal areas in India.The Government of India (GOI) approved it in Feb 2009. It is spread over 35 districts in 10 states with the development of 5500km (1100 highway and 4400 km state roads) with one to two lanes at an estimated cost of 7300 Cr.

Funding of the National Highway program

The various sources funding for national programs are:

i) Budgetary support

ii) Internal extra -budgetary resources (IEBR)

iii) Lending by Multilaterals like World Bank, ADB, JBIB. The Government of India (GOI) negotiated loans from multilateral for financing NHDP projects. These loans are passed to NHAI as a grant and loans.NHAI has received 300 million dollars from ADB for the Surat Manor Highway project.

iv) The revenue collected through tolls by NHAI is reinvested in building new projects.

v) The road ministry provides funds from the Central Road build by imposing cess on fuel to the state governments to build state roads

vi) Infrastructure Investment Trusts (InviT)

vii) External Commercial borrowing (ECB)

viii) Private financing under Public-Private partnership (PPP-BOT, DBFOT)

Expressways in India

The expressways in India are high -quality six to eight- lane highways with modern facilities. A total of 1600 km of expressways are built and 25,000 km are under construction. The National Expressways Authority of India works under the Road Ministry and is executing the body of the expressways program. India has a thin density of expressways in global comparison.

Under project "Bharatmala" 8eight lane expressways are under construction. The Delhi Noida Direct flyover was the first expressway in India. The 300 km Agra Lucknow is the largest expressway and 15 lane Delhi Merat is the widest expressway in India. Mumbai Vadodara (400 km), Mumbai Nagpur Expressway (600km), Delhi Mumbai Expressway (1500km), Narmada Expressway (1200km), and Nagpur Hyderabad (1000km) are proposed to build expressways in India. Eastern and Western Freeway in Mumbai are the only freeways in India. The Bandra Worli Sea Link is the part of Western Freeway also known as the Coastal Freeway is the longest bridge above the sea in India.

State Roads

The state highways linking the state capital to other districts are constructed and maintained by the state governments. The state highways are developed by State Public Works Department (PWD). The State Highways connect with the National Highways, district headquarters, cities, tourist destinations, ports, and other important centers within the state. The total length of state highways in India is two lac km with Maharashtra state having the largest 24% share. The state roads constitute 20% of India's total road network and carry 40% of the total road traffic. These roads get funding support from the central government as well as budgetary allocations from respective state governments. Capital expenditure on state roads in the year 2017 was 90,000 Cr.

Having seen the the success of national highway PPPs, the state governments too have used NHAI models of Toll and Annuity. Tamilnadu adopted HAM for its Outer Chennai ring road comprising both grant and annuity-Fund during construction and semi- annuity during operation. Uttar Pradesh Yamuna Expressway was built under PPP with a contract period of 35 years and a project cost of 15000 Crs. The project has a 165 km of six lanes connecting Noida to Agra. The project developer is Jaypee associates and Yamuna Expressway Industrial Development is the authority. The SPV is formed to build and operate the expressway and the right of developing the land alongside the expressway. The company has the right to develop 6000 acres of land along the Yamuna expressway. Agra Lucknow expressway which is 300 km (longest in India) with six lanes expandable to eight lanes, tolled controlled success highway/ expressway is constructed in Uttar Pradesh.

PPP Initiatives in Road Sector

The updated policy and regulatory framework for the road sector such as the Model concession agreement, Viability gap funding for PPP in infrastructure were introduced in thr eleventh five -year plan (2007-12). It was also decided to fund the NHDP program through the PPP route. The National Highways Authority of India (NHAI) has launched RFID based Electronic Toll Collection "FASTag." program on all toll plazas.

Table 1.2 PPP Projects by NHAI

PPP PROJECTS NHAI			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	40	43995.00
2	Under-Construction	113	112435.00
3	Operational	168	71509.00
4	Total	321	227939.00

Source: www.infrastructure.gov.in

Table 1.3 PPP Projects by Ministry of Road and Highways

PPP PROJECTS - MINISTRY OF ROAD TRANSPORT AND HIGHWAYS			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	4	4149.00
2	Under-Construction	3	5553.00
3	Operational	6	1427.00
4	Total	13	11129.00

Source: www.infrastructure.gov.in,MORTH

Table 1.4 PPP Project in State Road Sector

PPP PROJECTS - STATE ROADS			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	6	818.00
2	Under-Construction	81	56756.00
3	Operational	270	53196.00

Major Issues and challenges in the Road sector in India

The existing road network in India is congested and requires widening, expansion and modernization to cater to the heightened traffic at increased speed crucial for the Indian economy. Only 25% of roads are four lanes or above. The average truck and bus speeds on Indian roads are restricted to 35 to 40 km/hour. The existing road maintenance is not getting funds for their maintenance. The remote villages still have single lane, paved roads. The intra-city travel speed in India is the lowest in the world.

Very weak road densities per 1000 people always create congestion and slow speeds on roads resulting in fuel inefficiency and pollution leading to health issues for citizens and damaging the environment. Many Indian cities are building metros to address the climate change challenge.

Airports

Air transport is the fastest and the costliest way of transportation. The large industrial and commercial centers are spread spanning the entire country. These centers require very fast transport links. The manufacturing of large- size passenger and cargo aerplanes and their operations need better s hangar, landing, fueling, and maintenance facilities. Thus, air transport is affordable only for high -value goods. India is the third-largest domestic and civil aviation market globally. The total number of passengers reached 15 crores in the year 2016 managed by nearly 1000 aircraft. Boeing projected India's demand for aircraft to touch 2000 valued at $2500 billion, over the next 20 years.

The Ministry of Civil Aviation heads civilian aviation in India and DGCA is the regulatory body of the sector. The 2016 Civil Aviation Policy comprises connectivity, Safety, traffic rights, financial support, repair, and maintenance. Under the UDAN projects, the government is developing 550 airports in tier-two cities across India. There are total of 150 operational civil airports in India. Delhi, Mumbai, Chennai, Bengaluru, and Kochi airports carry 70 percent of air traffic in India.

The International Airports Authority of India was supervising the international airports while the National Airports Authority was controlling the local airports till they combined as a single organisation as the Airports Authority of India in 1995 .It is now a statutory working under the Civil Aviation ministry and is responsible for constructing and managing civil aviation infrastructure in India consisting of 18 intentional airports, 78 domestic airports,and 26 defense airports and 90 air carriers.

For FY2017, the AAI reported a profit after tax of INR 3,110 crore on an operating income (OI) of INR. 11,861 crore as against profit after tax of INR. 2,538 crore on an OI of INR. 10,255 crore in FY2016.ICRA has assigned the long-term rating of AAA for INR 1,500 crore proposed term loan. ICRA also has a long-term rating of AAA for INR 2,650 crore long-term bonds/debt program.

AAI is financially strong with better cash reserves. Its operating income is growing over the years due to impressive air traffic, revenue share from PPP airports such as Mumbai and Delhi, and growth in non-aeronautical revenues. In addition, the revenue growth in FY2017 and a current financial year is supported by the increase in aero charges levied by AAI across airports. Apart from strong internal accrual generation AAI also has access to a sizeable land bank, to fund these plans.AAI was looking at issuing bonds (2017) to raise funds to develop existing and non-operational airports.AAI has lined up Capex plans worth INR 17,500 crore over the next five years and will need to raise funds from the market if not allotted any budgetary support.

PPP in the Airport sector

Five international airport PPP projects, Mumbai, Delhi, Hyderabad, Bengaluru, and Kochi were successfully implemented in India involving an investment of 5000 crores. During the Twelfth Plan, an investment of 70,000 crores out of which 50,000 crore from the private sector was estimated to build new airports including New Mumbai and Goa airports.

Regulatory in Civil Aviation Sector

Airports Economic Regulatory Authority of India is a regulator of the aviation sector and looks after the safety measures of the airline industry and regulation of air travel prices and services affecting such fares and rates. The independent and autonomous regulator is required to address the challenges of the aviation industry with participants from both India and abroad and maintain regulatory certainty for investors.

Issue of higher airport charges

The prime challenges of the airport sector are higher charges on airlines and passengers and improper regulatory framework. The PPP airports in India works under a hybrid till mode, where the ratio of the aeronautical and non-aeronautical revenue is used to determine tariffs whereas AAI airports work under a single till where the combined aeronautical and non-aeronautical revenues decide the tariffs. The Ministry of Civil Aviation has decided to apply a hybrid till structure for all airports in India. The lessons learned from the PPP projects are required to be utilized for future PPP projects to overcome these challenges during the next phase of airport modernisation.

Table 1.5 PPP Projects in Airport

PPP PROJECTS IN AIRPORT			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	1	310000.00
2	Under-Construction	3	3640.00
3	Operational	4	29000.00
4	Total	8	342640.00

Source: www.infrastructure.gov.in

Sea Ports

India has a coastline spanning 7500 km long coastline. India's 90% trade volume and 60 percent by value are carried through sea transport serviced by 15 major ports and 190 minor ports. The major ports manage 75% of cargo traffic. The seaport contributes significantly to trade in the country.100% Foreign Direct Investment (FDI) is allowed for port development in the sea port sector. The major seaports are controlled by the union government's shipping ministry and the state government's maritime boards manage minor ports. The minor sea ports are identified by various state governments to develop through PPP mode.

In maritime transport, PPP model can be used to build container terminals, cargo berths warehouses, freight stations, docking, and ship repairing facilities. The PPP projects are offered through a competitive bidding process for the contract period of 30 years. The private developer offering the highest revenue share to the port authority is selected. TAMP is Tariff Regulator for major and minor ports. All new and existing ports are proposed to be corporaterised by setting them as companies and assigning them operational and financial autonomy to improve their performance.

Issues in Seaports

PPP is required in the port sector to encourage and increase competition, for capacity augmentation, increaseing efficiency and productivity, improving port competitiveness, to attract investment ,funding, strengthen linkage with global markets, strong global networking. Issues in the Port sector are that they are designed to handle specific types of cargo. There is underutilization of traditional berths, overutilization of new cargo berths and poor equipment utilization, and maintenance.

PPP model in Sea Port

Various structures and models such as BOT, BOOT, BOLT, and DFOT are used for constructing PPP projects in the sea port sector. The type of specific PPP model for the project is decided depending upon the type of contract.

Metro Rail

The union finance Minister in the 2019 union budget proposed a PPP model to develop metro rail infrastructure. A 200 km long line metro will be made operational in 2019. The finance minister expressed concern about the challenges in the adoption of PPP in metro rail projects. The solution lies in innovative approaches and bankable projects. The Government of India has made PPP mandatoryfor states to get a grant from the central government for metro projects.As per the private partnership is required in some form to get assistance from the union government for metro projects.

The first Metro rail PPP was the airport line of Delhi Metro Rail Corporation which failed as the concessionaire Reliance Infrastructure terminated the project due to heavy losses. Mumbai Metro Line-1 and Hyderabad metro rail adopted PPP mode using Viability Gap Funding (VGF) from the central government. The Rapid Metro in Gurugram project is executed by the Haryana state government where the private partner facilitated complete funding of the project.

Constraints

The major challenges in PPP metro projects in India are commercial viability and land acquisitions and permissions issues. No metro project has made an ROE of more than 3% yet while the private investors expect an ROE in the range of 13-15%.

The metro projects are also long tenure and highly capital intensive requiring long break-even periods which can be reduced by hiking fares which is difficult to implement due to uncertainty

in revenue collection making projects unviable. Government support such as viability gap funding and additional user charges to address this challenge to improve the ROI of a developer. The responsibility of land acquisition and right of way lies with the state government which is challenging due to stringent procedures in obtaining private land.

Opportunities for PPP Metro

In Indian cities with a growing population metro rail offers a better transport mix. The PPP model expedites the speedy and cost -effective execution of metro project creating better VFM by transferring risk to the private partner via a concession agreement. The metro offesr better environmental benefits by reducing carbon emissions. The state government should use innovative ways of raising finance for the metro projects.

Railways

Effective rail transport is a key driver for growth in the economy as it facilitates trade and commerce and links factories to national and international markets and transportation of labour and the availability of services like health and education. Rail transport is more energy efficient than road transport for bulk commodities transport. The Finance Minister in the 2019 union budget stated that the railway sector requires an investment of INR. 50 lakh crores between 2018 and 2030 especially for suburban railways and Rapid Regional Transport System.

The Indian railway, the fourth largest network of 1.2 lac km track length connecting 8000 railway stations with daily transport of two crores and thirty lac freight on daily basis is managed by the railway ministry of The Indian government. Indian railway is facing challenges such as low investments due to budgetary constraints, poor capacity, accidents duet to lack of adequate safety measures, heavy congestion, slow speeds, and railway stations in bad shape. The share of Indian Railways in surface freight has reduced from 85% in 1950 to 36% in 2012.

The railway budget merged with the union budget in 2017-18 to improve its financial condition. Besides that PPP model can be used to improve various services such as ticketing, station construction and maintenance, train coach manufacturing, state of the art signaling infrastructure and can bring much -needed private finance and revenue for states and optimum return for private investors.

PPP Initiatives in Railways

Indian Railway is attempting to attract private investment through PPP mode but was not successful due to tight control by the railway ministry except few rail and port connectivity. In 2012 the ministry launched a participative policy for investment in railway infrastructure from the private sector under which projects connecting railway stations, sea and airport, and nationwide factories where developers are selected through competitive bidding. The policy provides five PPP models such as private model, joint venture, BOT, funding by customers, and annuity model to raise finance for projects such as port connectivity, private freight terminals, private container operations and redevelopment of stations, and locomotive factories.

Capacity Generation by Railway PPP projects

During 2002 and 2017, 9 port connectivity projects worth about INR 4743 crore were initiated.

Table 1.6 PPP Projects in Railways

PPP PROJECTS IN RAILWAY			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	1	516.00
2	Under-Construction	4	2959.00
3	Operational	4	1268.00
4	Total	9	4743.00

Source: www.infrastructure.gov.in

Table 1.7 PPP projects in urban Transport (Metro, Bus terminal, BRTS)

PPP PROJECTS IN URBAN PUBLIC TRANSPORT(METRO,BUS TERMINAL,BRTS)			
Sr.No.	Status of project	No. of Projects	Project Cost
1	Pre-Construction	19	4800.00
2	Under-Construction	31	17067.00
3	Operational	24	4458.00
4	Total	74	26325.00

Source: www.infrastructure.gov.in

Challenges in PPP mode in railway

A.No independent regulator of the railway sector.

b. No experience in executing PPP projects for Railways.

1.5.2 Energy & Power Sector

In the power sector during the 11th five -year plan 55000MW power generation capacity was added. In power distribution, 70000 ckm transmission line, 1.5 lac MVA AC substations, and 1800 HVDC stations were added. The private sector contributed 40% of these capacity additions. For 12 th five plan 90000 MW power generation was planned with 55% private contribution.

Issues in the power sector

1. The electricity retail tariffs could not be hiked due to political interference widening the gap between power generation cost and the receipt driving Discom companies into big losses.

2. The state utilities did not contribute wholeheartedly to providing open access to consumer compulsory under the electricity act.

3. The inability of passing higher power trading costs to end consumers created the distortionary effects threatening the financial viability of Discoms.

4. The yearly loss of the state-owned utilities was INR 34000 crore in 2007–08 reached INR 52000 crore in the year 2017-18 making them unsustainable.

5. The issue in the delivery of the new power projects hampered the new power generation capacity of the power sector.

Table 1.8: PPP Project in Energy Sector

PPP PROJECTS IN THE ENERGY SECTOR		
Sr.No.	Sub-sector	No. of Projects
1	Electricity Generation	10
2	Electricity Transmission	27
3	Distribution	4
4	Oil/Gas/LNG Storage	1
5	Renewable Energy	299
	Total PPP Projects in Energy Sector	341

Source: www.infrastructure.gov.in

Renewable Energy Sector

Investment for large and longtime investors is coming in FY18 only in matured sectors like renewables and highways.RE sector in India in FY18 continues to hold the fancy of global utilities and investors. This is driven by the Indian government's push for achieving 175 GW by 2022. Various Incentives given are no transmission charges, Accelerated depreciation, Low-risk profile, and Stable/reducing equipment pricing. Only 11-12 GW of an auction was conducted in FY 18, Lack of regulatory clarity in some cases, Stressed position of off- takers, and Ambiguity in terms of 7.5% import duty and safeguard duty which resulted in floating of tender for only 19 GW (Solar 15GW and wind 4 GW) During Jan to March 2018.The uptick in solar tariff in bids due to increase in module prices, Site-specific characteristics, hardening of interest rates and uncertainty on import duty on modules.

As the auctions in the RE sector become larger and the ability of established players to raise capital at finer rates is a key differentiator, bidding in FY18 is witnessing participation from big players only and the number of bidders/auctions is reducing which augurs well for underlying investors over a longer period. A fallout of all of this has been that international players have become more aggressive in auctions in the financial year. During March 2018, quarter, international players own 57%57% and 61% of capacity auctioned in solar and wind bids. During the initial phases, several business houses set up RE projects of smaller capacities to take advantage of incentives like accelerated depreciation,80IA benefits ,and benefits from the higher tariffs on account of the low competition in the sector. Large players roll up smaller capacities into a bigger enterprises.

Large International utilities and global PE players have entered the market via the inorganic route. These players are aggregating capacities through big- ticket M7A as there are economies of scale available for both equipment and capital sourcing. The deal value ranges from 5.46Cr to 11.80Cr/MW and median 9.36cr/ MW)

Key issues in renewable power generations

i) The grid-connected renewable energy cannot scale up due in terms of generation and transmission due to the location specificity of the renewable energy sources.

ii) A larger and smarter transmission network is required for inter -state RE power.

iii) Renewable energy is costlier than conventional power and financially stressed states Discoms cannot afford it. Hence incentives like RPO and REC are required to enable them to buy the required power.

iv) Renewable energy projects need huge initial capital investments that involve high risk and high initial tariff discouraging investors to invest in such projects. A creative financial mechanism is required to arrange low lost long -term finance for the sector.

iv) Solar power has the issue of high upfront cost and the quality of solar collectors is very poor.

Challenges of solar and wind power sector:

1. The capacity utilization of grid -connected solar and the wind is inadequate due to under development of storage technologies.
2. The poor enforcement and monitoring of RPO obligations by states is a major challenge.
3. The RE project cost has hiked due to high land acquisition costs and the turnkey project methods.

Table 1.9 PPP Projects in the Renewable energy sector

PPP PROJECTS IN RENEWABLE ENERGY				
Sr.No.	Status of project	No. of Projects	Power in MW	Project Cost
1	Pre-Construction	158	37031	297095.00
2	Under-Construction	74	5021	31266.00
3	Operational	67	2739	14632.00
4	Total	299	44791	342993.00

Source: www.infrastructure.gov.in

Table 1.10 PPP Projects in Renewable Energy other than Hydropower projects

PPP PROJECTS IN RENEWABLE ENERGY OTHER THAN HYDRO				
Sr.No.	Project Type	No. of Projects	Power in MW	Project Cost
1	Co-generation Sugar	2	27	140.00
2	Solar	2	55	450.00
3	Wind	1	10.5	50.00
4	Waste Based	1	11.5	178.00
5	Total	6	104	818.00

Source: www.infrastructure.gov.in

Hydro Electric Power

The storage-based hydropower plants are employed during peak power demand. The hydropower potential in India is 150 GW out of which only 30% is utilised. Major hydropower sources are in North-East India and the Himalayan regions. The hydro-power is renewable, and clean vis-a-vis thermal power. The hydropower can also be used for irrigation and fishery. The share of hydro-power in the total installed capacity declined from 35% during the first five year plan to 20% during the eleventh five -year plan.

The main hurdles in harnessing hydropower potential in India are land acquisition and rehabilitation issues, lack of technology and funding, agitation by locals against the projects, environmental and forest issues, and natural calamities. The Government of India has taken various initiatives for sustainable hydropower development such as allowing private participation, guarantying a 15% percent return on equity, formulating rehabilitation and resettlement policy providing rehabilitation packages for affected locals. The center and states like Uttarakhand, Arunchal Pradesh and Himachal Pradesh have framed PPP policy and launched hydro projects in PPP mode to attract investors to harness hydro resources which are under various phases of implementation.

PPP Hydro-Projects in India

Due to resistance to large projects such as the Tehari dam, the government is now focusing on the small hydro planst (SHP) using Run on the river (ROR) and canal-based projects which are smaller in size, have no reservoir, and are placed on the downside of large hydropower projects. The number of such SHPs has doubled in the decade (2003-2013) due to exemption from Environment Impact Assessment in India.

Table 1.11 PPP Projects in Hydropower

PPP PROJECTS IN HYDROPOWER				
Sr.No.	Status of project	No. of Projects	Power in MW	Project Cost (INR Crore)
1	Pre-Construction	158	37031	297095
2	Under-Construction	74	5021	31266
3	Operational	61	2635	13714
4	Total	293	44687	342175

Source: www.infrastructure.gov.in

Solar and Wind Projects

Challenges of solar and wind power sector:

1. The lack of proper enforcement and monitoring of RPO obligation at the states level.

2. The cost of solar and wind power is higher than thermal power due to a lack of technology and economies of scale and higher project cost mainly due to land acquisition costs and delays in getting various environmental clearances.

Solar PPP projects

India was late in entering the field of renewable energy compared with its peers but now working hard to cope with them. The unit cost of RE power is declining rapidly and very soon comes at parity with conventional energy.

Solar - Based PPP Power Generation projects in India

Maharashtra State Power Generation Company (MSPGC) implemented a 50 MW grid interactive PPP solar project at Shirsuphal in the Baramati district in the state of Maharashtra with guaranteed revenue returns for 25 years with minimal investment. The Gujarat government implemented grid-connected rooftop solar PV power PPP in Gandhinagar attracting $10 million in private financing. The project added 5 MW of power to provide access to power for 10000 families and a reduction of 10 million metric tons of GHG emissions a year.

Ultra Mega Power Projects (UMPP)

The Government of India proposed "Power for all" by 2012 in the year 2005 for which the Power ministry launched large- size Ultra Mega Power Plants (UMPP) of 4000MW capacity based on coal to harness economies of scale to provide cheaper power. The UMPP projects are offered through global bidding on Build-Own-Operate (BOO) mode using supercritical technology to contractors. The projects were launched to address the issue of power shortage in the country.

The UMPPs were domestic coal sourced from coal blocks as well as imported coal-based located at coastal locations. These projects were planned to supply cheaper uninterrupted power to the consumers through fast power- generating capacity additions. The first four awarded UMPPs were Mundra in Gujarat, Sasan in Madhya Pradesh, Krishnapatanam in Andhra Pradesh, and Tilaiya in Jharkhand.

Issues with UMPP

Out of a otal of twelve proposed supercritical UMPPs in various states in India,a few projects encountered plagued uncertainties about fuel supply because some were based on imported coal and rise in coal prices due to government policies as the concessions were not have provision to pass on these price hikes to end consumers.

The developer of Krishnapatnam UMPP, Coastal Andhra Power Ltd (CAPL), had stopped the construction work due to regulation of the Government of Indonesia prohibiting the sale of coal below certain prices and raises the imported coal prices which resulted in termination notice from the lead procurer of the power from the project resulting in a long hauling court matter. In the case of Tilaiya UMPP, the developer terminated the project for not receiving the required land from the State government of Jharkhand.

Power Distribution

Power distribution plays a vital role in the power sector by collecting the revenue from the end users and pass on it to the generation and transmission sector but currently, in the Indian power sector, distribution is the weakest link laden with debt and losses making them financially weak because of inefficient metering, billing and collection process and failure in even recovering the generation cost leading to the very high combined losses of INR 40000 crore losses by all state - owned power utilities in India.

The loss- making and debt -laden power distribution companies are the weakest link in the energy value chain affecting both generation and transmission companies.Industrial consumers are either setting up their own captive plants or setting up solar plants which are hampering the business of the sector.

PPP Model in Power Distribution

The transmission and distribution losses were reduced by privatizing through a franchisee model in Delhi, Kolkata, Mumbai and Ahmedabad, and Bhiwandi cities. A Task Force on PPP in the Power Sector of the Planning Commission led by B K Chaturvedi suggested a Public-Private-Partnership (PPP) in the distribution of electricity making the private concessionaire responsible for the maintenance and operation of the power distribution network. The Shunglu Committee in 2012 studied the finances of Discoms favoured the franchisee model over public -private partnership (PPP) citing that completely open qualifying criteria may lead to bids from incapable and non-serious participants.

Table 1.12 PPP Projects in Electricity Distribution

PPP PROJECTS IN ELECTRICITY DISTRIBUTION			
Sr.No.	**Status of project**	**No. of Projects**	**Project Cost**
1	Under-Construction	2	400.00
2	Operational	2	381.00
3	Total	4	781.00

Source: www.infrastructure.gov.in

Power Transmission

The transmission network is an important link between the production and consumption of electricity. The Twelfth Plan proposed to build one lac ckm of transmission lines, 2.8 Lac MVA transformer capacity and 13000 MW HVDC system. Five regional grids operating as thesingle largest system in the world in terms of the grid size and system capacity of two lac MW with " One Nation-One Grid-One Frequency "objective. The challenges in the sector are land acquisition, line loading flexibility ,and achieving operational efficiency which can be addressed by measures like transmission lines up gradation, high capacity circuit line, Impedance Loading line towers, and reduction in the land requirement for substation, development of 1300 KV AC systems etc.

Table 1.13 PPP Projects in Electricity Transmission

PPP PROJECTS IN ELECTRICITY TRANSMISSION				
Sr.No.	Status of project	No. of Projects	Capacity CKM/KV	Project Cost
1	Pre-Construction	11	682	4589.00
2	Under-Construction	7	4734	10890.00
3	Operational	9	3137	6347.00
4	Total	27	8553	21826.00

Source: www.infrastructure.gov.in

1.5.3 Waste Management

The industrial growth results in more than 5 crore tonnes of municipal waste per annum in Indian towns leading to problems such as dumping waste in the open, unscientific closing of landfills, damages to public health, and carbon emissions. A scientific waste management infrastructure is required for the disposal of waste, its reuse, and recycling. A regulatory framework for PPP -based solid waste management is proposed through the 'Municipal Solid Waste Regulations 2000 to carry out scientific waste management including waste collection, classification, T and disposal by municipal corporations and State Government authorities.

PPP projects in Waste Management

IL&FS Waste Management and Urban Services Ltd. The largest private waste management agency executed 30 waste management projects including the waste collection of municipal solid waste, waste composting and plastic to Fuel conversion. Okhla Compost Plant project Municipal Corporation of Delhi had signed a Concession Agreement for 25 years on a DBOT basis with IL&FS for constructing a compost Plant of 500 TPD capacity using Aerobic Composting technology.

1.5.4 PPPs projects appraised by Niti Ayog during 2020–21

During 2020–21(1 April 2020 to 31 March 2021), 125 PPP projects, with a total cost of Rs 1, 72,314 crores, were appraised by the Vertical. This includes 123 Central Government projects and two State projects. The sector-wise distribution of the PPP projects (including the projects under the VGF scheme) appraised is given in the table below:

Table 1.14 PPP projects appraised by Niti Ayog during the Year 2020-21

PPP projects appraised by Niti Ayog during the Year 2020-21			
S. No.	Project Appraised	No. of Projects	Total Cost (Rs. In Crores)
1	Roads	69	63,279
2	Ports	12	3,359
3	Eco -Tourism	10	2,232
4	Silos	1	401

5	Petroleum Reserves	4	27,728
6	Ropeway	1	996
7	Telecom	9	29,199
8	Railway Stations	6	7,600
9	Railway Passenger Trains	12	30,099
10	Metro	1	7,420
	Total	125	1,72,314

Source: Niti Ayog

1.6 PPP Framework in India

1.6.1 Institutional Setup for PPP in India

The Government of India has developed a comprehensive framework for expedite the process of appraisal of PPP projects speedily and uniformly. The Cabinet Committee on Economic Affairs (CCEA) decided on the approval mechanism for PPP projects. The Government of India form the Public Private Partnership Appraisal Committee sanctioning PPP projects in 2006 with the authority to approve PPP projects for bidding out having project costs exceeding 100 crore rupees.

The PPPAC comprised of is made economic affairs department's secretary as head and CEO of Niti Aayog, secretary of expenditure, secretary of legal affairs, and secretary of the sponsoring ministry. A two Member Appraisal and Approval Committee of secretary-Economic Affairs and the secretary of sponsor Ministry approves the projects in the range of 1 to 2.5 billion. In November 2015, the CCEA declared that NHDP projects with Civil Construction Costs above INR 1000 crore need PPPAC approval and CCEA approval.

The Government is keen on developing a robust policy framework for PPPs in infrastructure building with sufficient checks and balances to attract private players to invest in PPP projects by creating transparency and fair competition to get the benefit of expertise and efficiencies and technology of the private players. The PPP projects are complex due to high initial investments, intricacies in transferring public assets to the private sector partner for the contract duration, the balancing of the conflicting needs of the project participants, and the complex structure of the project.

1.6.2 PPP Process

Project Identification

The sponsoring Ministry selects the projects to be executed on the basis of PPP and carry a feasibility study, prepare project structure and concession agreement with the help of legal, technical , and financial consultants.

Inter-ministerial Consultations

In case of projects related to multiple ministries, the concerned ministry consults with the inter-ministerial consultative committee before taking approval from PPPAC.

'In Principle' Approval of PPPAC

The concerned Ministry submit a proposal to the PPPAC along with the feasibility report and the proposed project contract to get "In Principal" approval for the project.PPPAC meeting is conducted within three weeks to consider the project for 'in principle' approval if contract deviates from model concession(MCA) agreement. In case of MCA compliant concession such approval is not required.

Expression of Interest

After obtaining the 'in principle' approval by PPPAC, the concerned ministry invites Request for Qualification (RFQ) from the pre-qualified bidders.

Formulation of Project Documents

The project documents comprise of various agreements to be formed with the private developer with terms of the contract about the rights and responsibilities of the concerned parties.

Appraisal/Approval of PPPAC

The concerned ministry prepares the request for proposal (RFP) for receiving financial bids from bidders and sends it for approval from PPPAC along with the project report and then floats RFP documents. Niti Ayog forward the approval to PPPAC and law and other involved miniseries also pass on their comments to PPPAC. The PPPAC secretariat forwarded all these comments for a response from the concerned ministry.PPPAC either approved the project or suggest the concerned ministry make certain changes. After clearance from PPPAC, the project is forwarded to the competent authority for final approval.

Invitation of Bids

The financial bids are invited after final approval from PPPAC. The Ministry of Finance scrutinizes the financial aspects of the contract such as guarantees and risk allocation in the context of the lender, and government spending. The Ministry of Law and Justice performs the legal scrutiny of the project. The 'In Principle' Approval of PPPAC comprises of the project name, its type such as BOT or DFOT, location, the project authority and the execution agency.

1.6.3 Institutional setup at the Central level

Cabinet Committee on Investment

The Cabinet Committee on Investment was set up in 2013 to expedite "critical projects" in the infrastructure sector and fasten the approvals and clearances process for the entire sector. The committee comprises the Prime Minister and various ministers from finance, road, urban development .etc.

Niti Ayog

The Niti Ayog is responsible for national economic strategic planning. The Secretariat for PPP in Niti Ayog designed policies to create world -class infrastructure, established the role of PPPs, and monitored the PPP projects. The secretariat maintains a database of PPP projects and PPP bid documents and model concession agreements. Niti Ayog in association with the ministry of finance decides major PPP policies in India.

PPP Cell

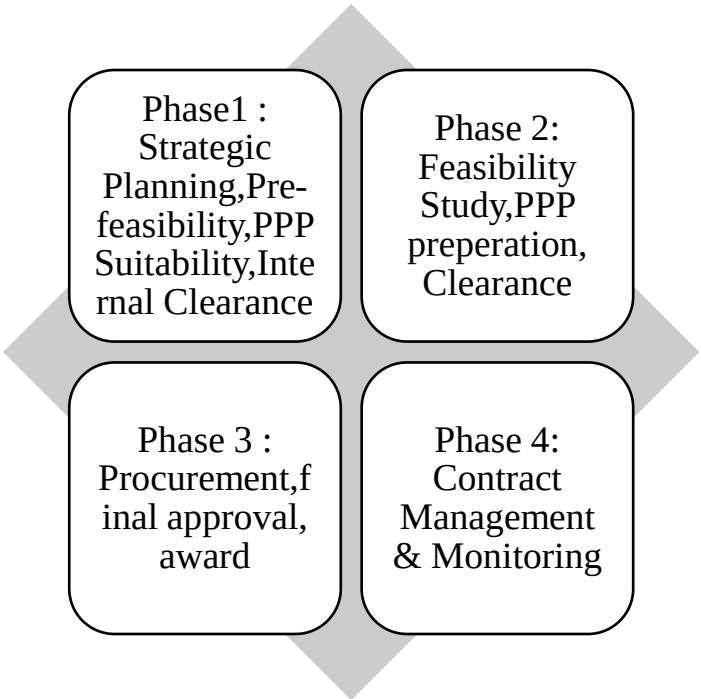
The PPP Cell is a modal agency working under the finance ministry design policy and programs of PPPs.The PPP Cell approves PPP projects with costs in the range of 100 to 250 crore and NHDP projects in the range of 250 to 500 crore. It supports state and local governments in terms of technical support for capacity building. It advocates increased use of PPP and maintaining database of nationwide PPP projects. The PPP Cell also exists in the states and termed nodal offices. The Department of Economic Affairs working under the finance ministry scrutinize the PPP contracts from the aspect of government expenditure.

PPP Database

www.pppinindia" www.pppinindia.gov.in has been developed by the PPP Cell of the Department of Economic Affairs (DEA) to impart information related to PPP.

1.6.4 PPP Procurement Process

Fig 1.2 PPP Procurement Process


Phase1 : Strategic Planning,Pre-feasibility,PPP Suitability,Internal Clearance
Phase 2: Feasibility Study,PPP preperation, Clearance
Phase 3 : Procurement,final approval, award
Phase 4: Contract Management & Monitoring

(Source: https://ppp-certification.com)

PPP in India has four phases. During Phase 1 the analysis of need, pre-feasibility and internal clearance is done to ensure the quality and success of the project. During the second phase feasibility study is done and projects are analysed in depth and an application for approval is sent to the competent authority. In the third phase bidding documents are finalized and the negotiations between the project authority and the bidder happen.The project is awarded to the successful bidder by signing the contract. Phase four covers the rest of the project's life including construction and operation, monitoring and management of the contract , and conflict resolution among the parties.

1.6.5 PPP Regulations in India

The legal framework for PPP in India

The legal framework comes from the Constitution of India and various rules and regulations authorities such as the NHAI Act, 1988, Indian Contract Act, 1872, Sale of Goods Act, 1930 and Negotiable Instruments Act, 1881 impact PPP model. The higher delay in dispute resolution is harmful to the economy. Hence speedy and high-quality dispute resolution mechanism which takes into account factors such as conflicts of interest and high investments is desirable to resolve disputes in a time -bound manner.

Dispute resolution is required during the procurement stage due to illegality in awarding concessions, during the construction stage due to land acquisition issues, and the contract management phase of the project. The judiciary in India preferred not to interfere in policy matters which is the responsibility of the government and expedite the resolution of disputes posing challenges to the economy and public interest and confined itself only to matters of illegality. For PPP projects, the Department of Economic Affairs has notified Model Request for Qualification which contain specific procedures for PPP projects. The project authorities prepare MCA containing the basic terms and rules for PPP projects for their projects which collectively form the regulatory framework for PPPs in India.

India is a federal country the PPP authorities are divided on the central and state basis such as PPPAC, NHAI, Airports Authority of India, Major Port Trust, State Governments, Ministry of Shipping, and Department of Economic Affairs. The government's efforts in the area of PPPs are to achieve the objectives of providing efficient and quality public services at reasonable cost improving the quality of life of the citizens while considering the adverse socio-economical of the projects.

The process of the feasibility study, project conceptualization, due diligence and Value for money analysis is mentioned in PPP toolkits issued by the Ministry of Finance, Government of India. The toolkit includes tools for accessing financial viability, Value-for-money tool and readiness for the project.

Rule 150 of the General Financial Rules 2005 provides the legal basis for issuing procurement notices of PPPs with provisions such as publishing all tenders on the website , posting the complete bidding document on the website and allowing bidders to download the tender documents. The central government firm publishes tenders contract award details on the central

public procurement portal. The Model RFQ explained the eligibility criteria for pre-qualification of bidders, the procedure for obtaining clarifications from the procuring authorities and criteria for evaluation of bids such as VFM. The sector -specific MCA contains provisions for execution, contract management, and monitoring of projects.

The events of default and termination from either the concessionaire or from NHAI.The grounds and consequences of the termination and termination payment to the concessionaire are described in MCA. In case of termination by NHAI during the project operations, NHAI shall pay to the concessionaire 90% of the debt as a termination payment. As per the MCA clause. The Kelkar Committee has given its suggestions for reforming PPPs in India. NITI Aayog suggested to form a national PPP policy encompassing procedures and processes for using a uniform approach on key issues affecting the growth of PPPs.In the central budget of 2016, the government of India announced to set up a new mechanism 3P India to support to PPP model.

1.7 Background of the study

Since independence, the basic physical infrastructure developed in India was not sufficient enough considering India's geographical size and high population. The infrastructure bottleneck is a serious economic issue in India and the quality of public infrastructure like roads, railways are not at par with the global comparison. The public infrastructure is a significant challenge to the Indian economy.

Before the economic reforms in 1991, the central government used to build the infrastructure. The India Infrastructure Report 1996 on infrastructure put forward the first ever infrastructure sector's requirement of investment for its development. India invested INR 28 trillion in the infrastructure sector in its 11^{th} five -year plan for the duration 2007 to 2012. This investment was 7.5% of GDP higher than 5% in the tenth five year plan. The major investment came in the telecom and power sector. The 12^{th} Five-year plan (2012-2017) proposed an investment of INR 56 trillion in infrastructure, almost double that of in the 11^{th} Five year plan , 48% of which was supposed to come from the private sector.

1.8 Rationale of the study

The investment requirement for country's infrastructure development is huge and cannot be managed by the government alone due to its budgetary constraints and requires active participation from the private sector both in terms of capital and expertise. Since the 1990s, governments worldwide implemented the idea of building public infrastructure in association with the private sector which is termed Public Private Partnership (PPP).

In India, PPP program started with great enthusiasm and active participation by the private sector with a spurt in terms of the number and investment amount in the decade from 2000-2010. In the 2015 Infrascope report of The Economist Intelligence Unit, titled "Evaluating the Environment for PPPs in Asia-Pacific 2014", India ranked first globally in terms of PPP project's operational maturity, third in terms of subnational PPP activity and fifth in terms of a

conducive environment for PPP in the infrastructure sector. In two decades from 1998-2018, 21% of the aggregate infrastructure projects in India were started on a PPP basis.

But since 2012, the overall slowdown in PPP projects was witnessed with a large number of PPP projects delayed and stalled. Many projects were canceled and become non-performing assets discouraging the lenders to lend for the new projects. The confidence of both the government and the private sector had been hampered. The PPP model had become less exciting and failed to attract private developers for new PPP projects.

Even though The Government of India developed institutional and legal frameworks to expedite the PPP model, real challenges were encountered in the implementation and contract management of these projects. Even though India has registered 1000 plus projects, the weak and rigid regulatory and institutional frameworks and ineffective governance failed to build a sustainable and efficient PPP in the Infrastructure sector in India.

The Asian Development Bank estimated a 5 trillion dollar investment requirement for India's infrastructure sector by 2030 which means 300 billion dollars every year almost three-time the current investment of 100 billion dollars per annum. Much of this investment is expected to come from the private sector which is hampered due to slowdown in the economy and demand and NPA issues in the banking sector.

The ongoing PPP projects in sectors such as roads, rail, and airports are facing execution challenges stretching their and lender's balances sheets affecting investment in fresh projects. The government's ability to kick start new projects on its own is limited by the fiscal and budgetary constraints of the government. The government is required to reset and revitalise the PPP model in India to build world -class infrastructure for its citizen.

Lackluster response of private parties to PPP projects and shifting from BOT to EPC

Table 1.15 shows the number of projects floated on PPP/EPC basis year -wise. As can be seen in table 1.15, a maximum number of projects floated (153) in the year 2010. After that number of PPP projects decline and there was a shift in mode of infrastructure development from BOT to EPC.

Table 1.15 Number of PPP projects floated year wise

Number of PPP projects floated year wise		
Sr. No.	Year	Number of Projects
1	1993	1
2	1996	1
3	2000	3
4	2001	3
5	2002	3
6	2003	1
7	2004	4
8	2005	14
9	2006	80

10	2007	103
11	2008	85
12	2009	96
13	**2010**	**153**
14	2011	135
15	2012	106
16	2013	78
17	2014	19
18	2015	45
19	2016	53
20	2017	42
21	2018	25

Source: pppinindia.gov.in. NHAI, MORTH

Fig. 1.3 Graph of the Number of PPP projects floated year wise

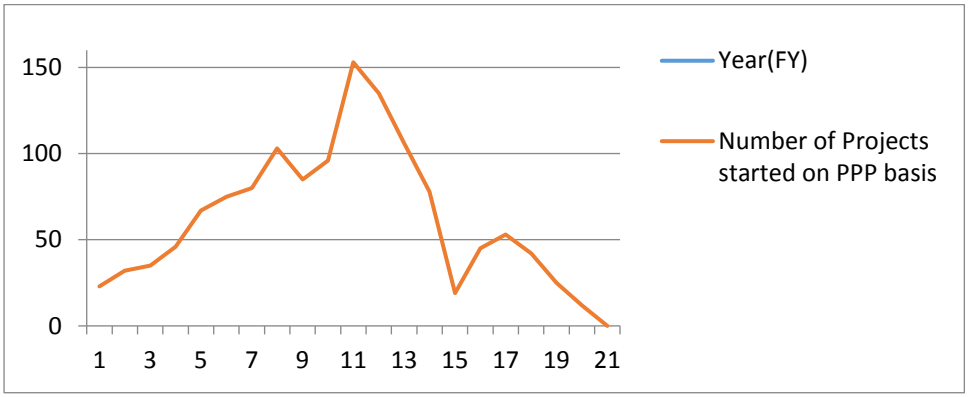
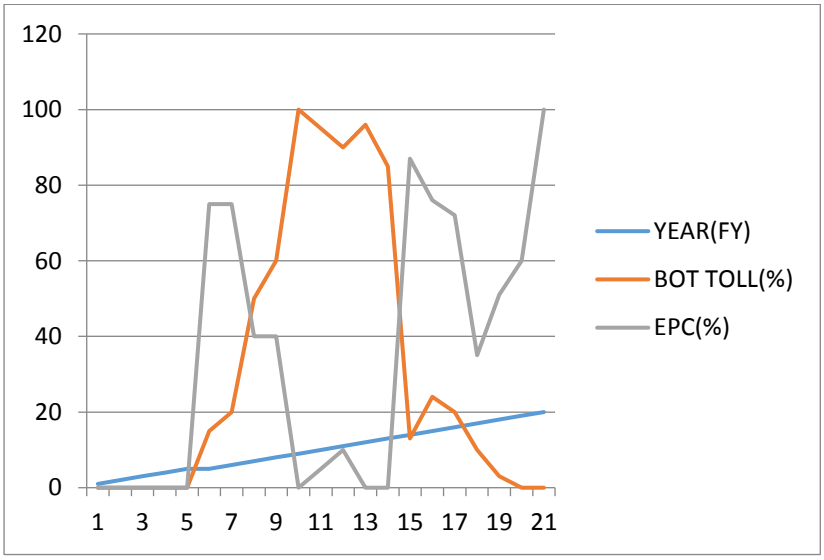


Table 1.16 The transition from EPC to BOT and back to EPC in Road Sector

Transition from EPC to BOT and back to EPC in Road Sector				
YEAR(FY)	BOT TOLL (%)	ANNUITY (%)	HAM %)	EPC (%)
2005	15	10	0	75
2006	20	5	0	75
2007	50	10	0	40
2008	60	0	0	40
2009	100	0	0	0

2010	95	0	0	5
2011	90	0	0	10
2012	96	4	0	0
2013	85	15	0	0
2014	13	0	0	87
2015	24	0	0	76
2016	20	0	8	72
2017	10	0	56	35
2018	3	0	46	51
2019	0	0	40	60
2020	0	0	0	100
Source: NHAI, MORTH, Ind-Ra				

Fig 1.4 The transition from EPC to BOT and back to EPC in Road Sector



1.9 Significance of Study

The study aims to investigate various causes for the disappointing performance of the PPP model in India and may be useful for the private developers and policymakers for future PPP projects.

1.10 Organization of the thesis

This exploratory and analytical study has been conducted in a step-wise manner. The thesis is divided into seven chapters:

Chapter 1 - **Introduction:** This chapter provides the introduction, background, and rationale of the research topic, an overview of the PPP model and worldwide trends in PPP, identify the problem area, and discusses the significance of the study. This chapter provides an overview of Infrastructure subsectors in India like roads, seaports, airports, railways, metro rail, hydropower, ultra mega power, water and sanitation, desalination.

Chapter 2 - **Review of Literature**: This chapter presents the Review of related literature carried out to understand the underlying theories of PPP in infrastructure and empirical studies in this area. From the in-depth literature review, the research gaps were identified and the research objectives were defined.

Chapter 3 - **Research methodology**: This chapter narrates the research methodology adopted for the study. It is used to test the propositions of the research questions and describes the tools used for testing and the sampling plan of the study.

Chapter 4 – **Data Analysis**: This chapter presents data & analysis of delayed, stalled, terminated, and Operational PPP Projects.

Chapter 5 – This chapter presents the overview of the contract and risk Management of PPP projects in various Infrastructure subsectors.

Chapter 6 – This chapter presents the findings of the study and Discussions about them.

Chapter 7 – This chapter provides Conclusions, Suggestions, and Recommendations for the efficient implementation of PPP projects in future.

Appendices- Exhibits the data of terminated/canceled PPP Projects in India, the data of delayed and stalled under- construction PPP projects in India, the data of NHAT Toll based PPP Road projects in India, NHAI Annuity based PPP Road projects in India, and data of State Roads PPP projects in India which is used to calculate financial returns of Operational projects and Contractual Issues in individual PPP Projects are included in the Appendices.

1.11 Summary

This chapter has presented an overview of the PPP model. The PPP modality, PPP concession, global trends in PPP, and evolution and current state of PPP in India. It also has provided the background of the study, the significance of the study, and the definition of terms used in the study. The results of this research will assist the stakeholders in PPP and infrastructure development to devise and adapt suitable measures to remove bottlenecks and address issues and effectively implement PPP for infrastructure development in India

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Chapter 2

Review of Literature

Chapter 2

Review of Literature

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2.1 Introduction

The chapter focuses on the literature on PPP models of public infrastructure development worldwide and specifically in India. Governments worldwide were struggling to build public infrastructure due to constrained budgets. Hence they were possibilities of providing infrastructure services in partnership with the private sector to utilize their capital, efficiency, and expertise to build the public infrastructure. This search has introduced a novel idea of Pubic private partnership or PPP. Various definitions of PPPs are available in the extant literature.

British Columbia Ministry of Finance (2002) defined PPP as a contractual agreement between the government and a private partner to develop the public infrastructure. Allan (1999) has given seven definitions of PPP. The other definitions of PPP focused on allocation of risks and rewards between government and a private partner. The word PPP has become widespread from the decade 1990 onward (Davies & Eustice, 2005).

In traditional procurement, the government authority plans the infrastructure facility and floats a tender with specifications. A contractor is selected through the auction process and paid for his work as per contractual terms. In a PPP mode, the authority only specifies the desired output to be provided by the private contractor. The private partner selected through a competitive bidding, designs and constructs the project and receives the payments set ex -ante for the complete life cycle of the project which recovers financing cost and provides the optimum return to the investor and the private sponsor (Yescombe 2007).

The infrastructure project development process consists of four stages, planning, funding, constructing, and maintaining the project. When the government does all these tasks alone, it is termed as a public provision and when some of these tasks are assigned to the private party,

it is termed as PPP mode. (Bettignis, Thomas Ross, 2004). In PPPs financial risk is transferred to the private partner from the government.

The capital expenditure and operations terms are included in a PPP contract. The private developer first builds the project with its funds and then operates it for a longer tenure of 15 to 25 years and once the contract gets over, transfers the project assets back to the government which has awarded the contract. During the operation stage, the private developer collects toll to recover the cost incurred for building the facility.

Bettignies and Ross (2004) explained three significant differences between PPPs and traditional procurement; (i) As compared to traditional procurement, PPP comprises a larger number of tasks by the private developer to design, fund, construct, operate and maintain the project. (ii) A special purpose vehicle (SPV) is a structure used to execute PPP projects. (iii) The financial risk is transferred to the private partner in PPP.

2.2 Transaction Costs Theory

The transaction cost consists of the cost of searching appropriate business partner, negotiation, and completion and enforcement of the contract. The sum of transaction and production cost in turn decides if a transaction is to be done internally or outsourced in the market. A new institutional transaction cost approach minimizes the overall cost. (Hayek, 1945). The transaction cost economics came into the limelight when Commons (1934) propose that relationships with other stakeholders is equally important as economies of scope and scale.

Coase suggested reducing transaction costs by appropriately allocating within a firm (hierarchically) or between firms working in the market. In his subsequent research, he discussed searching, negotiation, and contract making and enforcement coss as a part of transaction costs (Coase 1937.1960, 1988, 1992).

Further research on transaction cost economics was done by Williamson (1975, 1985, 1991, 2002a). His model suggested a reduction in production as well as transaction costs through appropriate make-or-buy decisions and vertical integration. After a certain limit, organisational growth saturates due to the dampening of incentives and loss of control due to transaction transfer from the market to the firm. (Williamson, 1985). The basic assumption of Williamson's model is that firms interact in a business environment where the rationality of people is restricted by their intellectual capabilities called bounded rationality. Selten (1990) explained bounded rationality is related to inspirational aspects.

The second significant assumption of Williamson is the opportunistic behaviour of the players involved termed ex -ante and ex -post opportunism. Due to factors like bounded rationality, opportunistic behaviour and uncertainty, all contracts inherently becomes incomplete and the result in subsequent negotiation, lack of information and control leading to the higher transaction cost. The causes of this organizational non-fulfillment are disturbed relationships, lack of trust in the business environment (e.g. absence of friendships), large asset specificity, complex environment and uncertainty which makes organisations internalize the production

process (Williamson 1975). In such situation, both partners deal with uncertainty based on their experience and accordingly adapt their governance structure.

When one partner decides to do specific investments in a future contract with another partner, he gets locked into that partnership. The inability to redeploy specific assets results in the transfer of an ex-ante competitive environment into an ex-post bilateral dependency and lock-in situation (Williamson 1985). The asset specificity decides the amount of opportunity cost and level of bilateral dependency. When an asset specificity attains a certain level, it is desirable to carry such transaction in the firm's hierarchical structure (Williamson 1975).

The relationship- specific investment in a particular transaction carries very little value outside the relationship. Therefore a contractual partner making a specific investment depends upon the compliance of the contract. This dependency carries a risk of renegotiations which may result in blackmailing (holdup). This resulted into underinvest by partners

A transaction cost is the expenses such as dealer's commission, information and communication expenses, transportation and outsourcing cost and the price differences between buyer and seller in exchange of goods due to imperfections in the market. The transaction cost is instrumental in incomplete contracts. It includes the cost to think and write down all possible contingencies legally, the difficulty to describe a contingency clearly for verification by the court. Hence parties form incomplete contracts ex- ante with a higher probability of renegotiation leading to delay and inefficiencies. Klein Crawfard and Alchain ((1978) and Williamson (1975, 1985). The asymmetric information leads to ex -post inefficient allocation. In situations where the parties are locked in with each other and a break up leads to loss and inefficiency, the holdup problem emerges.

Implications of transaction costs theory for public-private partnerships

The various tasks in PPP mode require specific capital. The hold-up risk is in proportion with the required capital which necessitates stringent legal regulations and subsequent monitoring and enforcement. The objective of public interest is welfare maximization which is in contrast with the profit maximization objective of the private partner.Efficient contracts are possible in the case of mutually beneficial investment, if the partners attain maximum welfare of stable quality. But in reality, if quality differs, the re-negotiation ability of the public authority weakens due to the priority of maximum public welfare. Under such circumstances, very few efficient contracts are possible (Muhlenkamp 2006).

The complex procurement procedure of public authority resulted in higher transaction costs in public works. Transaction costs include the costs of information, negotiation, enforcement, opportunity cost, time and effort spent. In timeline terms, they are classified as pre-contracting (ex -ante), contracting, and post-contracting forms (Dahlman, 1979). Formal regulations through correct incentives and safe contracts can reduce the transaction cost. The correct procurement process can reduce the transaction cost and increase the project's economic value and ensure the success of the project.

Merrow (2011) opined that procurement systems and type relationships among project partners can impact project execution and performance. The variances in project design and availability of information during procurement also affect the transaction cost (Wenan and Mengjun 2010). The transaction cost in PPPs includes information and negotiation costs, cost of contract management, and cost of contract monitoring (Melese and Franck 2005). Alsagoff and McDermott (1994) explored the reasons for disputes between project authorities and developers as contractual incompleteness and opportunism leading to conflicts between project partners. The authors suggested relational contracts as an alternative to dispute resolution

Zhang (2011) suggested for optimum risk allocation strategy to reduce transaction costs. The improper risk allocation results in high contingency costs, monitoring costs, contract enforcement costs and legal costs. Dudkin and Valila's (2006) study on UK's construction projects concluded that the PPP projects in the UK are affected by high procurement costs which is approximately 10% of the total project cost. Then during project execution opportunity costs due to renegotiation and project completion delays severely affect the financial returns of the project (Ho and Tsui 2009). Transaction cost like negotiation, performance measurement, and monitoring costs also adversely impact project benefits.

The procurement selection process depends upon contract terms and the cost of transactions. The transaction cost analysis is done to decide contract management mechanisms including formal contracts, terms, and conditions, termination rules, terms of warranties and long-term agreements, and partnerships. Such disposition mitigate the risks in procurement and deal effectively with the issue of opportunistic behaviour and asset specificity

The monitoring cost is also a transaction cost appearing ex -post, during the contract execution. The monitoring is essential as the payment to the private partner is related to its performance and quality of work done. The monitoring cost is higher if there is a lot of information asymmetry between the project partners. Investing more in the monitoring process results in more transparent contract execution but reduces the total surplus for the public authority due to inflated monitoring costs.

2.3 Contract Theory

Three prominent types of contracts are complete (state contingent) contracts, comprehensive cntracts (principal agent theory) .and incomplete contracts. An incomplete contract has gaps, incomplete provisions, and confusion which can be corrected by renegotiation or court cases with compulsory positive probability in some states of the world (Hart 1995). A large number of business contracts are incomplete, not contingent on information present in the the public domain and usually get renegotiated or resolved by courts.

2.4 Theory of incomplete contracts

The modern theory of incomplete contracts which is an extension of the transaction cost originated by Grossman-Hart (1986) and Hart - Moore (1988). The contracts in the Principal-Agent theory are complete as contingencies are mentioned for all states. Whereas incomplete contracts theory is based on information symmetric which resulted in the adverse selection and

moral hazard (Martiensen 2000). When the agent's action cannot be verified and the agent possesses private information after receiving the contract, a moral hazard takes place. (Macho Stadler and Perez-Castrillo 2001). For example if the government award to construct a hospital without knowing about the latest technologies involved in the work may lead to moral hazard due to private information possessed by the contractor and the information asymmetry. A Moral hazard won't occur if both the agent and principal have identical objectives.

PPP contracts are long tenure contracts where it is not possible to include all contingencies in all states of the world hence they are incomplete in nature leading to renegotiations and inefficiencies making residual rights powerful Grout (1997) and Bettignies and Ross (2004). Ross (1973) introduced a contract governance mechanism to make the agent act in the interests of the principal, such as enchasing projects NPV to reduce agency cost due to conflicting goals of the principal and agent. Trailer et al. (2004) suggested a compounded agency view as a new dimension to the agency theory for PPPs.They concluded that the agency problems in PPPs arises due to residual rights of the private partner raising its revenue but reducing the public surplus which is a goal of the government as a principal.

2.5 The property rights theory of Grossman and Hart (1986)

The asset holder can use the residual rights as per his wish without any contractual or legal obligation. (Hart 1986). Some peculiar control rights can be contracted but not the residual rights of the owner. The ownership rights decide the bargaining capacity of the two partners and surplus sharing affects their ex-ante investment incentives. Hart model describes the advantages and costs involved in vertical integration. The advantage is in terms of an increase in incentives for investment for the owner of the integrated firm and the disadvantage is in terms of loss of incentive for non-owner. The model answers Coase's question of why it is not possible to arrange all activities in one single firm and why selective intervention does not always work.

The cost of writing a contingent contract without any ambiguities is very high. The design of contracts and subsequent renegotiations depends upon asymmetry of information and involved transaction costs. The frequent renegotiations are the predicament in PPP contracts that adversely affect the competition as the contractor expert in bidding aggressively while assuming ex-post renegotiation wins the contract against the most efficient and eligible contractor. The property rights theory proposes various solutions to deal with issues involved in the renegotiation of concession agreements.

Neoclassical Theory of the firm

A firm is a production box that converts input to output. The prime goal of the firm is profit maximisation. The boundaries of the firm are decided by the minimum of the average U-shaped cost curve. Ronald Coase (1937) dealt with the nature of firm and described the existence of transaction costs without which the market is often best -coordinated device.

Principal Agent Theory

The theory deals with disputes due to asymmetric information. The incentive issues determine the optimal structure of a comprehensive contract. For a comprehensive contract firm structure is irrelevant for any allocation. The Fisher Body-GM case showed the cost of using incomplete long contracts to deal with the hold- up issues and the usefulness of vertical integration.

Moral Hazard and Adverse selection in PPP

In PPP projects there is a frequent problem of asymmetric and insufficient information between the project authority (principal) and the project developer (agent) called as an agency problem. The problem arises when the efforts of the contractor cannot be verified, inappropriate allocation of risk, absence of information about the status of the project, unsound selection of the project contractor, and occurrence of renegotiations. The asymmetric information leads to adverse selection and hidden action results in the moral hazard. The disadvantages of Moral Hazard are the absence of competition, inflated transaction cost, reduction in profit and value of the project, fraud etc.

Contracts in Physical Infrastructure

The physical infrastructure work spans for a longer duration and involves various economic and political actors and depends on the efforts and investment of these participants. The risk assessment of projects is closely linked with the contracting terms set between the partners. The exogenous risk like a storm cannot be mitigated. The endogenous risks are influenced by contracting terms e.g. contractor using substandard cement to save his cost. Stakeholders have conflicting preferences about cost and quality. The verification of the performance of the parties is not possible due to issues in the monitoring process. The participants have private information about contractual variables e.g. builder has information about cost, sponsor about budget or policy.

It is impossible to define all future contingencies that can adversely affect the timeline and cost of the project while forging contracts. The appropriate regulations are required to deal with exogenous and endogenous risks arising due to asymmetric information and incomplete contracts. The standard cost-benefit analysis is employed in the environment of perfect symmetric information. But in the case of asymmetric information, it is imperative to take into account the contracting cost coupled with the agency problems created by asymmetric information. This indigenous cost of contracting can be controlled by institutional capacity by performing ex-ante and ex-post audits including enough contingencies in the contract. Theory of incomplete contract is used in PPP focusing on the cost and benefit of building infrastructure.

The book by Laffont and Tirole (1993) "New economics of regulation" discuss the advantage of the firm having private information and subsequent hidden actions not accessible to the regulator. The privatization prevents government access to the contractor as against the firms in the case of public procurement where the efficiency of the private player is known. Hence in the case of privatization. firms get information rent and exert less effort which is bad for ex-post incentives.

Another strand of literature about incomplete contract theory is described by Grossman and Hart (1986), Hart and Moore (1990), Hart 1995) – is useful for the analysis of contract and risk allocations in PPPs.Williamson (1975-85) states that a problem occurs when relation -specific investment is involved in transactions. A party that makes no investment tries to grab a share of the surplus generated by the investment made by another party.

The incomplete contract cannot protect parties against opportunistic behavior as the court can distinguish good faith and bad faith renegotiation requests (e.g. which is triggered by one party to take advantage of investment of other party. Williamson suggested remedy of integration to address underinvestment trap. Grossman Hart and Moore stress on asset ownership which gives residual rights of control over assets. The ownership of assets gives incentive for investment due residual rights on asset while lack ownership kills the incentive to invest.

The prime objective of the project authority is to provide high quality of infrastructure service to citizens at optimum cost (social benefit) while motive of the developer to enhance efficiency and get better returns (cost reduction) on his investment during operation period of the project. In Hart's model, there are two types of investment. In first type (e) the operating cost lower with increase in social benefit. In other case (i) cost reduces at the expense of service quality. The bundling allows the operator to internalize positive effect of investment on operating cost which also improves quality of service beneficial to society. The bundling of construction and operation in PPP results into social benefit of enhanced quality as compared with traditional public procurement method.

PPP introduces a long term profit motive for the developer to gain more returns by quality enhancement and reduction in cost. Another source of contractual incompleteness is change in objectives of the party or when sponsor change his mind to make changes in location or design and enter into renegotiation with the contractor which makes contractor to change his design which maximizes his payoff. The free rider issue is costly for the authority to protect the developer against changes in design and in such scenario traditional procurement is preferable.

The large projects are plagued by cost overrun (Peck and Seherer 1962) and Flyvberg 2003).When the initial contracts set a specific cost under uncertainty in terms of technology or other things affecting the project ex-post ,cost increases than the set target. Flyvberg (2003) concluded that cost overrun takes place because of the will of the contractor to grab the contract for which he bid too below their expected cost. The key aspects of the European public works contract are transparency, strict performance targets, complete contracts and enhancing "Competition".

Financial aspects of PPP

PPPs are beneficial for governments interested in window dressing of their accounts by manipulating public accounting rules by using PPPs to show lower public debt by hiding debts of PPPs which is ultimately responsibility of the government. A private contractors encounter hurdles in credit market as its credit rating is lower as compared to the government entity due having right to tax but government cannot tax inadvertently

The classical agency theory is a tradeoff between risk allocation and offered incentive. When setting up a contract, the government should balance between risk and benefits. Transferring a risk to developer does not make any sense if the work cannot be contracted. At the other extreme, in case of allowing the developer to bear complete risk, government has to pay large risk premium to the developer.

The competition in the market provides a natural benchmark for performance analysis of contractors. It is not desirable to pass uncontrollable macroeconomic risk such as inflation to the private developer instead a predictable regulations such as liking toll rates to inflation.As per corporate finance theory higher external funding reduces the incentives of internal management as the benefits are transferred to external financiers. Hence debt ridden contractors should be dealt with care. The debt finance is better than external equity to motivate the contractor to put more efforts.

The anticipation of soft budget constraint distort the auction. In absence of bankruptcy decision rights are transferred to external investor/bank that is not subject to such soft budget constraint which is illustration of lack of commitment and completeness of contract.PPP provides incentive for life cycle cost saving when builder and contractor are same i.e. bundling but there is concern about quality of service which should be controlled by contract and monitoring.

Debt Contract

Debt contract is a contract between the project SPV and the bank which provides the debt and specifies the amount of loan and terms of repayment. A debt contract is an incomplete contract due uncertainty throughout the debt period with limited liability i.e. if SPV defaults then debt cannot be repaid which may lead to moral hazard by the project developer such as misuse of debt funds. A quasi rent is included in a tender to address moral hazard which can be expropriated by the bank.

Renegotiations

In PPP contracts whenever the environment changes, a new information or technology is revealed or design error in existing work is identified, a renegotiation takes place. But many times renegotiations are misused by both the parties such as expropriation by the government or lowering technical standards by the contractor to reduce cost and it difficult to differentiate between fair and unfair renegotiations.While renegotiations are helpful for debt provider as it reduces the default risk, it harms the public benefits. Besides it kills the incentive of the contractor to work diligently to reduce his risk and losses due to his inefficiency.

The PPP project cost increases inadvertently due to large amount of bilateral and arbitration panel awarded renegotiations Engel et al. (2007). Guasch (2004) reported that almost 30% PPP contracts were renegotiated in Latin America dominated by water (75%) and transport sector (45%) in a sample of 1000 PPP projects executed in 20 years. (Gomez-Ibanez and Meyer, 1993).During 1990 - 2004, only 3% of PPPs worldwide were cancelled and rest were renegotiated (Thomsen, 2005). Government prefer renegotiations due to contract ambiguity, lack of funds and absence of independent regulators (Bracey, 2006).Worldwide 50% of PPP

proposals failed in attaining the financial closure stage and those pass through this stage faced hurdles of renegotiation during construction stage (Bracey 2006).

Risks in PPPs

All risks in PPPs must be identified, quantified, shared and managed. The optimum risk allocation enhance benefits and reduce losses to both partners. If the risks are not mitigated by the project authority, the private sector lose the confidence on the government and PPP model and stay away from future PPP projects and the government lost the public benefits from the PPP projects. (Bracey 2006).

The economic efficiency must be considered for toll based contracts to deal with uncertainty and reduce the renegotiations.(Athias, 2007).Another alternative to toll roads is availability contracts where the government takes away demand risk from the private party. But the concession contracts can provide incentives for creativity and innovations by private players to reduce the cost as compare to availability contracts.

The legislative framework for foreign and domestic investment should ascertain the certainty of protection of ROI and repayment. It is observed that the renegotiations soon after award of the contract. Guasch (2004) reported an average two years between award of contract and the first incidence of renegotiation.

Engel, 2009 and Bracey, 2013 have reported that contracts bid at lower level with anticipation improvement in returns through renegotiations which occurred shortly after award of concession and scope also increases during renegotiations. The renegotiations frequently occurs in toll road projects due to inherent uncertainty in demand forecasting, asymmetric information and underbidding (Athias, 2007).

Stakeholder theory

Freeman (1984) introduced stakeholder theory which reviews the conflict of interests and addresses morals and value in management of a firm. Donaldson and Preston (1995) suggested manager's to understand and respond positively to diversified stakeholder interests Shankman (1999) stated that stakeholder theory is extension of agency theory while dealing with stakeholders in trusted environment with loyalty and honesty.The objective of agency theory in PPPs is to match interests between private developer and project authority to enhance project value by reducing agency cost through efficient contract mechanism.

The recent PPP studies highlight importance of building trust based relations with project stakeholders to ensure their support for the project. (HM Treasury 2012, NAO 2009). For infrastructure projects government, citizens, businesses, consumers, competitors, people's representatives. The external financers such as banks and bond holders funding to the project are the stakeholders and their consultation and support is essential for success of PPP project. (NAO 2007)

2.6 Value for money (VFM)

VFM is measure of providing a better quality service at minimum cost to the users.(Allan Grimsey 2001, HM Treasury 2004).Creating maximum Value for money (VFM) is a prime objective of PPP model (Allan 2001, HM Treasury 2006, Whitfield, 2006).A major aspect of the PPP model is to allocate the risk who can manage it efficiently and achieving maximum VFM through optimum allocation of risk among project participants (Davies 2008) and selection of efficient private partner during procurement is key factor for success of PPP. (Aziz 2007, Chan et al. 2011) and instrumental in creating the VFM for the project (Stahr, 2006).

The important tool for policy makers is applying VFM analysis is cost benefit analysis (CBA) which involves whole life cycle costing applying DCF method and risk analysis to evaluate benefits of the project in terms of value creation by the project.The methods considering the time value of money such as net present value (NPV), the internal rate of return (IRR), benefit cost ratios (BC) are used for evaluation of economic aspects of the project (Ye & Tiong, 2000).NPV is calculated by first measuring discounted future cash flow of the project for life span of the project and subtracting the initial project cost . NPV method is used for comparing the bids during procurement (Watson, 2005).The factors such as economic costs, risks, benefits discounted over the lifespan of the project are considered to decide tradeoff between public procurement and PPP (Grimsey & Lewis, 2005).VFM tools is used in Australia, Canada, France, South Africa, Spain and UK (Boardman & Vining, 2010, Burger & Hawkesworth, 2011).

In Australia if PPP project vis-à-vis traditional procurement method is compared on the basis of lowest risk and cost.The countries like Chile, Australia and Ireland use multistage ex post VfM analysis including quantitative, risk and expert analysis for PPP projects whereas France, Greece, use VfM analyses for PPPs (Burger & Hawkesworth 2011).Few countries do VfM analysis of PPP using a Public sector comparator (PSC) as a hypothetical benchmark PSC (Grimsey & Lewis 2007).The risk allocated to private partner and risk bear by the government authority is accounted in VFM analysis (Grimsey & Lewis 2007)

The estimated risk transfer value in Australia for PPP project on the basis of PSC is 7%, while in the Britain it is in the range of 9-14% (Grimsey & Lewis 2007). If the discount rate in VFM analysis is more, net present value (NPV) becomes lesser and PPP project becomes attractive. (Boardman & Vining 2010; Yescombe 2007).Hence the discount rate is distinguishing factor in comparison of PPP and traditional procurement (Hodge 2010). HM Treasury in Britain use 3.5% as discount rate for 30 yearlong PPP projects (HM Treasury 2011, Grimsey & Lewis 2007).

In some countries a discount rate depends upon type of sector like transportation, power etc. Whereas in Australia discount rate decides on case-by-case basis while south Africa apply long term borrowing rate as a discount rate. A 2009 study of VfM studies produce mixed results of transportation projects (Hodge & Greve, 2009).

2.7 Empirical evidence/Evaluation of PPPs

Various author's views terms of performance of PPPs are highly contrary. Some authors favours PPP projects while others reject it.Hodge and Greve (2007) examined PPP-projects of the PFI type in UK. They conclude that PFI projects "delivered on time" "deliver construction risk successfully", and "cause considerable design innovations". There was "cost savings of 10 to 30 percent, due to risk transfers from the public to the private sector"

But various authors contradicted these views concluding that PFI projects were more costly and less accountability in it than traditional government projects.Many authors have evaluated PPPs in terms of transfer of government resources for other areas and VFM generated in comparison with traditional procurement.In terms of resources it was concluded that PPPs did not help to ease pressure of government budgets neither had they built expected infrastructure nor is generation of VFM still not confirmed. Hodge and Greve (2007) concluded that the PPP model performed better in transport sector but failed in healthcare and information technology sector.The bidding cost PPP projects was 5 to 10% of overall cost due longer and complex procurement. (Yescombe 2007) and average procurement and bidding pocess was of 35 months (NAO 2007).Vining and Boardman (2010) in a study of PPP in Canada observed that the contracting cost has inflated overall project cost and also questioned the social benefits of PPPs for public infrastructure and further concluded that only those projects were demand risk was not transferred to the private were performed better.

Arthur Anderson and Enterprise LSE (2000) report concluded 15% cost savings for PFI projects as compared with traditional procurement and created better VFM. But this claim was rejected by Pollock, Price and Player (2007) questioning the methodological basis in terms of time and project structure, sample size and measurement bias and overall biased approach of this research.Blanc-Brude, Goldsmith and Välilä (2006) concluded that the construction cost of European PPP project was 25% higher than traditional projects.

Oum, Adler and Yu (2006) based on their study of 115 airports concluded that government owned airports performed better than PPP airports. Various studies by (Diamond 2005; Friend 2006; and Jacobson and Choi, 2008) suggested that practically it is challenging to forge partnerships between the government and the private parties. Many authors like (Hayllar and Wettenhall 2010; Bernardino et al. 2010) described failed PPP model in developing countries due to complex, incomplete and risk prone contracts.Edwards et al. (2004) showed that the construction cost of PPP projects in UKn was 25% higher. Dudkin and Välilä (2006) calculated overall PPP transactions costs to be 13% of the total project cost. Flyvbjerg (2002) suggested overall cost overrun of 30% for a sample of global projects and 23% for European projects. Mott MacDonald (2002) showed cost overrun of 22% for sample of large capital projects.The VFM of PPP project can be evaluated by comparing cost overrun against benefits such as timely completion of project, better service and reduced operational cost. (Frederic Blanc-Brude, Hugh Goldsmith and Timo Valila 2007) in their empirical studies suggested that bundling of construction and operation cost inflate the construction cost which further reduces overall life cost of the project and transferring risk to the private party. The suitability of PPP model and VFM generated depends upon the amount of life cycle cost saving.

Dudkin, Gerti Valila & Timo (2007) observed that transaction costs to the government and the bid winning contractor vary between countries depending upon legal framework in the country and usually high for small projects and in projects delayed during procurement process. Engel et al. (2009) argued that PPP did not release pressure on government projects. The budget savings due to PPPs are compensated by loss of future revenues and tax receipts. Engel et al. (2009) recommended to use PPPs for the efficiency gains due to bundling rather than financial benefits.

2.8 Project Finance

Finnerty (2007) explained project finance as funding of project on no recourse or limited recourse basis by an investor who interested in cash flow of the project adequate enough to service the debt and generate optimum return on equity. Esty (2004) defined project finance as financing of a legally independent project company through equity from sponsors and debt on nonrecourse basis.

In project finance lending to economically separable and self-sufficient project is done on the basis of the cash flow generated by the project (Yescombe 2007).Project financing structure is highly leveraged and cash flow is the only guarantee to the lender. The assets of the project being are not liquid and carries no outside value in case of failure of the project.

A Special Purpose Vehicle (SPV) is set up by the project sponsor for a specific project to manage the project. After evaluating the credibility of the sponsor, financiers provide the debt. The contractor infuse the equity in project to get the contract and financial investors invest to get returns from the project. The sponsor is not allowed to withdraw his equity till the closure of the project which blocks his capital for longer duration preventing him investing in fresh project. Hence the returns of the project should be adequate enough to recover high initial equity cost bear by the sponsor.

During construction phase equity, bridge loan, mezzanine debt and bank loans are sources of finance of the project and after construction completion, bank loan is replaced by corporate bonds. The monitoring of SPV is done by banks which prevents any act of moral hazard by providing debt as per the achievement of project milestones (Tirole 2006, Yescombe 2007).The long term investors prefer to invest in bonds of completed projects with certainty of cash flow for longer tenure of the project (HM Treasury, 2006) But since economic slowdown in 2008, such institutional lenders have moved away from PPPs (Hodge & Greve, 2013).The equity stake of the contractor in the project indicates his performance incentive. The Operating revenues coming from user as a toll or from the government as annuity should be adequate enough for servicing the debt and the maintenance expenses (Smith, Alexander & Phillips 2011).

The project financing permits high gearing through non-recourse financing and off-balance sheet treatment of loan and provides efficient risk management and attractive returns at the cost of complexity due more number of partners.Post global financial crisis Asia Pacific region's project finance transaction volumes constituted almost half of the global market and project finance becomes tool to transfer financing burden on the private sector and mitigating political

risk arising out of it in developing countries in Asia and Latin countries (Yescombe, 2007, Kleimeier and Megginson (1998), Wang et al. (2004), Griffith-Jones and Lima (2012), Hainz and Kleimeier (2004).

Determining the optimal leverage of a firm is challenging in corporate finance .The literature of project finance in relation also focuses on financial synergies. Since project finance deals large size risky projects, risk management is a key focus of research. The fundamental consideration in project finance is to transfer risks to the partner who can bear and manage it.Hence the value of the project can be enhanced through an efficient risk management (Sorge, 2011).

2.9 Review of Indian literature on PPP

Akalkotkar & Malek (2016) conclude shortage of Government funding and pressure by the citizens as significant driver of PPP in India. Lakshmanan (2008) mentioned issues such as opaque procedures, faulty risk transfers, time and cost overrun and ambiguity in regulatory roles, lack of good governancein PPP.Mathur Swati (2017) investigated land acquisition and cost overrun risk as the biggest hurdles for PPP model in India. Baruah & Kakati (2016) pointed to land acquisition, demand risk & financial risk as the causes of failure of PP model in India.

Harisankar & Sreeparvathy G. (2013) discussed failure of arbitration system in India and opined that arbitration system in country did not prevent the cases reaching to the courts.The delays and rigidity in legal procedures and institutions failed to emerge as effective dispute resolution system. An effective dispute resolution system with a single appellate authority at the center is desirable solution to resolve conflicts in Indian PPPs.

Kakati & Baruah (2016) discussed highest risk in operation stage due to lack of bargaining power of developer in terms tariff changes and macroeconomic shocks beyond control. The demand risk is high in Indian transport PPP projects due to public resistance to toll collection hence a survey should be conducted to understand willingness of users to pay the toll before bidding for the project. An independent regulator is required for all infrastructure sub sectors to care of model concession contracts, conflict resolutions, preventing cases to reach arbitrations and court, fair revision of toll, reallocation of risks, setting appropriate performance benchmark.Rajeswari (2014) suggested land acquisition delay as a cause of lackluster response from the developers in road PPs.Gupta Rajiv (2015) exhibited cost overruns of more than 50% in case of Delhi and Mumbai PPP airports.

2.10 Does Infrastructure project add value to economy?

Aschauer David (1989) and Banister and Berechman (2000) illustrated link between infrastructure investment and aggregate productivity. The conventional economics stated positive correlation between higher public-sector investment in infrastructure and efficiency and profitability of the private businesses. Paul Krugman's (1991) in his theoretical model demonstrated lowering the cost of infrastructure building increases their values. Sanchez-Robles (1998) demonstrated a positive effect of public capital on the productivity. Fan and Zhang (2004) argued that the infrastructure increases productivity.

In contrast studies by Flyvbjerg et al., 2002, 2003, 2005, 2009; Flyvbjerg and Budzier, 2011; Ansar et al., 2014) has illustrated poor socio-economic and environmental outcome of infrastructure investment and raises questions about socio economic welfare and issues about NPAs and loss of alternative investment opportunities and destruction of VFM of the projects. The capital budgeting theory states that the value of firm is sum value of NPVs of all its projects. Similarly national wealth is the sum of the value of all the investments undertaken. The negative NPV of projects affect the public benefit as observed in China (Atif Ansar et al. 2016)

2.11 Research Gap

Extensive review of literature helped in understanding and identifying few research gaps that need to be addressed.The literature on PPP model discusses merits and demirits of the PPP model, ex ante aspects like transaction cost, contract management and allocation of risks. But very few ex post empirical studies are available about entire life cycle performance of operational PPP projects globally in terms of time, cost and financial Returns (Value for money) created by these projects and life cycle based cost benefit analysis of PPP projects.

In India, PPP has reached to a maturing stage in last two decades and good number of projects is in operational phase. Some projects have even completed their life cycle (construction plus operational phase). This study is designed to analyse the financial performance of operational projects in various infrastructure subsectors in India to evaluate if they created reasonable financial returns for private investors as this final returns is the biggest motivation to attract private partners to create public private partnerships to build the much needed infrastructure.

In this empirical study based on principles of Project Finance, the data of all individual operational projects is collected and analysed to evaluate the value created by these projects in terms of NPV, Project IRR and Equity IRR After aggregating value for all individual projects, the study has concluded about the overall performance of PPP model of public infrastructure in India to investigate the research question whether PPP model in India is proved to be methods for the provision of public infrastructure in India.

The study aims to explore PPP model in India in terms of contract management, regulatory aspects, risk allocation among partners, and infrastructure capacity generation in India. While the literature on PPI allows to better understand the theoretical aspects and historical trends of PPPs, its focus was restricted to the initial stages of the PPP such as procurement very little is explored about a project's execution and operation phase and the attainment of the expected efficiency gains. The data is non-existent in this sphere of PPPs.Therefore the study attempts to gather and analyse sound data in terms of entire life cycle management in terms of financial performance, contract management and risk management and other aspects such as institutional capacity, dispute resolution mechanism, handling of renegotiations and terminations in Indian context is value addition of this research in the arena of PPPs.

2.12 Summary

PPP is a contract between the government authority and private developer of longer duratoion to build the public infrastructure. The budgetary constrained government resoty to PPP model to transfer the finance risk to the private sector.The task of planning, construction, funding and operation is bundled together in PPP projects.The private partner accept to bear the risk in the project with the anticipate of good financial returns from his investment.The success of PPP model rests on generating positive value of money through efficient contract management and efficient life cycle cost management and optmum sharing of risk.

Chapter 3

Research Methodology

Chapter 3

Research Methodology

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3.1 Introduction

This chapter discusses the Research design and Plan, Research methodologies, Tools used for analysis, sample size, and sampling technique adopted for the study.

3.2 The Research Plan

Any infrastructure project whether done by the government or the private party or the public - private partnership basis must be evaluated on the basis of the iron triangle of time, cost ,and benefit i.e. the project should be completed on or before the stipulated time, within cost and achieve objectives and deliver benefits for which it is carried out.

This Study set out to do an analysis of public infrastructure projects initiated in India from 2001 to 2020 on Public Private Partnership (PPP) basis. A large number of these projects failed to be completed or terminated at different phases during their life cycle, either financial closure, construction ,or operations stage.

Even the projects those completed the life cycle or currently operational were disappointing to the private developers and investors in terms of providing adequate financial returns primarily due to time and cost overruns during construction and legal and contractual disputes during the operational phase. This has disappointed both the government and the private sector in terms of not achieving the intended objective of providing world- class infrastructure to its citizens with which one of the largest PPP in infrastructure programs was initiated and executed for the

last two decades while providing adequate financial returns to the private partners to motivate them to participate in the PPP program.

Based on the above discussion, there are three categories of PPP projects in India:

1. PPP projects which were awarded, started but could not be completed, delayed, stranded, and cancelled/terminated during various phases of projects such as financial closure, construction, or operational phase.
2. PPP projects in which construction is completed and the infrastructure is up for use but not to the satisfaction of the private partners in terms of reasonable financial returns.
3. PPP projects which are successful in terms of time, cost, quality, and their intended objectives of creating infrastructure like roads or airports to the satisfaction of the end users and provide adequate financial returns to the private developer and value for Money for the Government

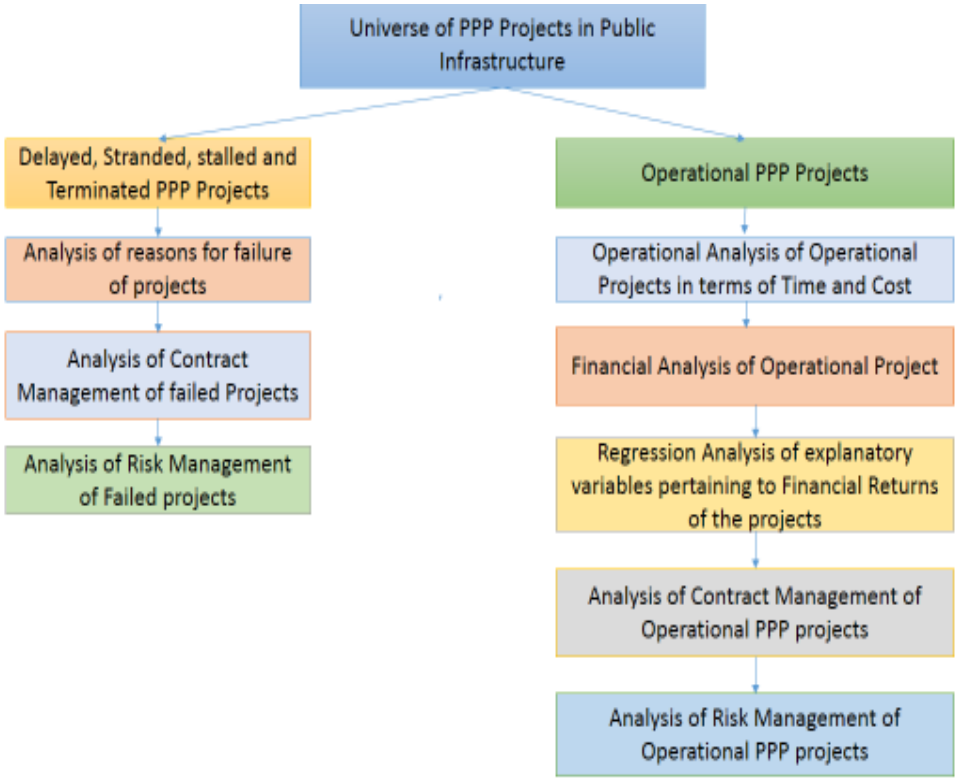
Fig 3.1: Three categories of PPP in infrastructure projects in India

1.Incomplete Delayed, Stalled & terminated PPP Projects
2.Completed ,Operational but Financially Disappointing PPP Projects
3.Completed , Operational and Financially Successful Projects

The study was planned and done in three phases:

Phase 1. In the first phase, failed (delayed, stranded, holdup, terminated, and cancelled) projects during financial closure, construction and operations are analysed. The analysis is done to find out the causes of such failure in the context of institutional and contractual mechanisms, procurement processes, dispute resolution, renegotiations, terminations or cancellations, and overall management of these projects in terms of contract management and risk allocation and management among partners.
Phase 2. In the second phase, PPP projects which have completed their construction and are currently operational and projects which have completed their contracted life cycle are analysed. A hypothetical financial model is developed to calculate the life cycle financial returns of such projects (NPV and IRR). Then the analysis is done at an aggregate level to evaluate if these projects have created adequate financial returns to the private partners and positive value for money for the entire project.
Phase 3. In the third phase, an analysis has been done of operational projects that failed in creating reasonable financial returns for the concessionaires and other stakeholders of the project.The study has done an overview of contract management of PPP projects in various subsectors of infrastructure and finally, the study is concluded with the aggregate level analysis of PPP in the infrastructure model in India.

Fig 3.2 Research Design


Universe of PPP Projects in Public Infrastructure
Delayed, Stranded, stalled and Terminated PPP Projects
Analysis of reasons for failure of projects
Analysis of Contract Management of failed Projects
Analysis of Risk Management of Failed projects
Operational PPP Projects
Operational Analysis of Operational Projects in terms of Time and Cost
Financial Analysis of Operational Project
Regression Analysis of explanatory variables pertaining to Financial Returns of the projects
Analysis of Contract Management of Operational PPP projects
Analysis of Risk Management of Operational PPP projects

3.3 Statement of the problem

As per the Asian Development Bank report, India has been among the top five emerging economies in terms of developing the PPP model in the last two decades. India has developed requisite institutional setups and procedures for procurement of PPPs but the most concerning issues are encountered during execution and implementation levels.

As per the government database more than 1300 projects in various subsectors of infrastructure from 1998 to 2016. In the year 2012, the largest number of projects contract was signed in the history of PPP projects in India. But after 2012, there was a sharp decline in the number of projects launched on a PPP basis. In the road sector which constitutes 70% of PPP projects in terms of numbers, the central road construction implementation agency, the National Highway Authority of India (NHAI) has changed the PPP model of Built –Operate-Transfer (BOT) to Hybrid Annuity Model (HAM) to attract private players and showed its appetite for bearing more risk. Despite these measures taken by the government, private sector partners who had taken a back seat in terms of participation in a PPP program. Very few players are now interested in participating in PPP projects. Even the banks are not willing to finance these projects. So it has become imperative for the government to spend its scarce financial resources to create infrastructure such as roads.

This study titled "Critical Analysis of PPP model in infrastructure sector in India" aims to study this phenomenon and do a critical empirical analysis of the PPP model in India.

3.4 Scope of the Study

a) The study is limited to PPP projects officially registered as PPP projects in the government database www.ppp-in-india and infrastructure.gov.in

b) The time frame of the study is from 2001 to 2020.

c) The scope of the study includes 170 completed and operational projects and 150 stranded, delayed, and cancelled / terminated projects.

d) The study covers the infrastructure sector like roads (NHAI and State roads), airports, seaports, Metro rail, Ultra Mega Power projects, Hydro and solar renewable energy projects, water and sanitation projects, Power transmission pojects, healthcare projects done on PPP basis.

3.5 Research Design

An Exploratory research design using mixed mode i.e. combination of quantitative and qualitative methods is used in this study to achieve the research objectives.

Quantitative Study

A) A quantitative empirical analysis of a sample of 150 delayed, uncompleted failed projects in various subsectors of infrastructure like transportation, power, and metro rail is used to discern the causes for the failure of these projects.

B) To explore the financial returns of the operational projects, a bottom -up approach based on principles of Project Finance, is implemented wherein the data is collected of individual operational projects to calculate NPV, Equity IRR, and Project IRR and finanally the aggregation of financial performance of all operational PPP projects in the study sample.

For this empirical study of the PPP model, the sample consists of 170 operational projects in various subsectors of infrastructure like roads, power, and metro rail. For every individual operational project, first ,the financial data in terms of revenue, cost, debt, interest, depreciation ,etc. is collected and then financial returns of the project in terms of Net Present Value (NPV), Project IRR and Financial returns to private partners (Equity IRR) is calculated by using a hypothetical financial model developed for this study.

Qualitative Study using Case studies

1. Five cases of delayed, stalled and terminated PPP projects to study qualitative aspects of Risk and Contract management

2. Two cases of financially successful operational projects and three cases of financially distressed operational PPP projects to study qualitative aspects of Risk and Contract management

3. Overview of contract and risk management of PPP projects in various subsectors of Infrastructure.

3.6 Sampling Technique

The financial, contractual and operational data of projects of two categories constituting the sample 1) The Operational Projects and 2) The Failed projects (stalled, delayed, terminated) is collected from various sources and databases as shown in the given table.

In case of case studies cases of both successful and failed projects, critical cases from each infrastructure sector are selected and analysed.

3.7 Sample Types and sizes

SAMPLE OF THE STUDY		
No	**Types of Projects**	**Sample size**
1	Completed and Operational Projects	170
2	Delayed, Stalled & Terminated Projects	150

Justification of the Sample Size

The initial data of each project is collected from The Government of India's PPP database (websites www.infrastructureindia.gov.in & www.pppinindia.gov.in). Further the economic and financial data of the project is obtained from annual reports and an online databases. The projects with complete authentic data available in the public domain are included in the sample.

3.8 Research Instrument

1. Hypothetical Financial Model

2. Cases studies of operational and failed PPP projects

3. Regression Analysis to analyse the determinants of financial returns of operational projects

4. Simple statistical Analysis to explore the causes of uncompleted projects

3.9 Sources of Data

The preliminary data of PPP projects which have been initiated by the government authorities and for which concession agreement is signed by the project partners have been collected from websites www.infrastructureindia.gov.in & www.pppinindia.gov.in which are the official databases of PPPs in India and maintained by the Ministry of Finance, Government of India.

The data specific to individual projects (SPV) is collected from various sources such as:

- Annual reports of Project SPVs and Project Promoters of all PPP projects
- Credit RatingRreports of Project SPVs
- Websites of SPVs and Promoter companies.
- CAPITAL LINE and PROWESS database
- Websites of various Project implementing Government agencies such as NHAI, AAI etc.
- World Bank, IMF, CRISIL, CMIE and Ministry of Finance reports on PPP projects

For individual PPP project, following information is collected

Data Collected for individual PPP Project					
1	Name of Project SPV	6	Project Details	11	Project Promoter
2	Credit rating of Promoter	7	Project SPV credit report	12	Date of Concession Agreement
3	Date of Financial Closure	8	Date of Appointment	13	Date of Construction completion as per CA
4	Concession Duration in Months	9	Project Cost in INR Cr	14	Date of Construction completion (Actual)
5	Actual Total Project cost in INR Cr	10	Date of End of concession		

The financial data is gathered from the corportate database CAPITALINE and the project's SPV's annual reports.

Financial Data Collected for Individual Projects					
1	Total Revenue (for each year)	6	Total debt	11	Profit before tax
2	Operating expense (for each year)	7	Equity	12	Tax
3	Operating profit (for each year)	8	Interest and principal repayment	13	Reported net profit
4	Secured Debt	9	Depreciation		
5	Unsecured Debt	10	Gross profit		

A hypothetical financial model is designed to calculate the following parameters of the project:

1. NPV of the project
2. Project IRR
3. Equity IRR
4. Time overrun of the project
5. Cost Overrun of the project

Calculated Financial and Operational Parameters of the project	
SR NO	**Financial Parameter Calculated**
1	Net Present Value of the project
2	Internal rate of Return of the project (PIRR)
3	Equity IRR of the project
4	Cost Overrun in percentage
5	Time Overrun in months

The cost and financial returns of an operational PPP project are determined using the hypothetical financial model. These projects were of three categories, some projects completed their operations phase, some amid the contract, and a few have recently become operational.

For operational projects which have yet to complete their contract terms, assumptions are made in terms of growth in future cash flow.

Delayed and Stalled projects

The data is collected of projects in various sectors which have been initiated as PPP projects and awarded winning parties in the bidding process and eventually ,such projects were either cancelled, stalled, delayed ,and still under construction. The projects are investigated in terms of the causes of their failure to become operational. The analysis of the overall contractual performance of nonfunctional PPP projects is done. For this empirical study, the sample consists of 150 non-operational projects including terminated/cancelled projects and delayed and stalled under- construction projects.

The preliminary data of PPP projects have been collected from websites www.infrastructureindia.gov.in & www.pppinindia.gov.in which are official databases of PPPs in India and maintained by the Ministry of Finance, Government of India. Data specific to individual projects (SPVs) collected from:

- Annual reports and credit rating reports of SPVs
- Credit Rating reports for SPVs of the projects
- Financial data from Annual reports of SPVs and The Sponsor companies
- Financial data PROWESS and CAPITAL LINE database
- The critical information about terminated projects is collected from India Infrastructure Finance Company Limited (IIFCL)'s notice to Asset Reconstruction Companies (ARCs) "Inviting Offers for sale of financial assets dated March 6, 2018. IIFCL is a prime government funding agency for PPP projects in India.

For individual PPP project, following data has been collected.

Data Collected for individual Terminated/Delayed/Stalled project			
1	Name of Project SPV	2	Project Details
3	Project Promoter	4	Date of signing a contract agreement
5	Estimated Project cost in INR Cr	6	Reason for Hold up of the project
7	The terminating party	8	Category of Reason for termination

3.10 Data tabulation

The collected data is tabulated using Excel spreadsheets and then inputted into a hypothetical financial model to calculate the IRR and NPV of individual projects. The logistic regression model with the chosen set of explanatory variables is run using SPSS.

3.11 Research Questions

The Research Question proposed to be addressed in this study are:

1. Is the PPP model in India, a desirable alternative to traditional government procurement methods of building public infrastructure?

2. What are the results of Indian PPP infrastructure projects in India in terms of financial returns to private partners/investors?

3. Does the PPP model in India bring efficiency, investment, and economic value to the infrastructure sector in India?

4. What was the contractual performance of Indian PPPs in managing contract creation, execution, and enforcement in terms of operational and financial performance and financial risks of the projects, and risk allocation among the shareholders?

5. Why the private investment and interest declined in PPP in infrastructure programs in India since 2012?

3.12 Research Objectives

The research objectives of this study are:

1. To conduct an indepth analysis of the PPP model of public infrastructure in India.

2. To perform an empirical analysis of the PPP project's performance in terms of project cost, completion time, and financial returns to private concessionaires, and Value for Money generated for the government authority.

3. To analyse Contract management and Risk allocation among stakeholders in the Indian PPP model.

4. To evaluate if the PPP model in India has been effective in building a world -class infrastructure delivering positive value for money.

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Chapter 4

Data Anaysis

Chapter 4
Data Analysis

Section A

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4.1 Quantitative Analysis of Delayed, Stalled, and Terminated PPP projects

Introduction

The study is conducted in three stages. In the first part of the study, the operational, financial, contractual management, and risk management related data of 150 stranded and cancelled PPP projects is collected. The raw data which is obtained through various sources have been converted into useful information. This information is critically analysed to investigate the reasons for a large number of delayed and stranded projects (46%) and terminated projects (5%) out of total PPP projects in public infrastructure initiated in India..

In the second stage, the operational, financial, contractual management, and risk management related data of 170 completed and operational PPP projects is collected. The raw data which is obtained through various sources have been converted into useful information. The data is input in a hypothetical financial model developed specially for this study to calculate the financial returns i.e.Net Present Value (NPV) and Internal Rate of return (IRR) of the operational projects and financial returns earned by the private developer's i.e.Equity IRR and equity NPV.

The regression model is run with the chosen set of explanatory variables using SPSS software. The analysis is done to find out if the financial returns are satisfactory both for the private partner in terms of adequate risk -adjusted financial returns and Value for money for the public authority.

The universe of PPP projects in India

Table 4.1 Details of PPP projects in India from 2000 to 2020

Status of PPP projects in India initiated from 2000 to 2020			
Sr. No.	Project Status	No.of Projects	Percentage
1	Operational PPP Projects	625	46.02
2	Projects Under Construction (initiated till the year 2016)	670	**49.33**
3	Terminated Projects	63	4.63
4	Total projects initiated till the year 2020	1358	

Source: www.pppinindia.gov.in and Author's calculation

Table 4.2 Sectorwise Distribution of PPP Projects in India

Sectorwise Distribution of PPP Projects in India			
Sr..No.	Sector	Number of Projects	Share of subsector in total PPP projects in %
1	Transport	810	59.49
2	Energy	317	23.28
3	Water Sanitation	105	7.66
4	Social & Commercial Infrastructure	126	9.45
5	Communication	0	0
	Total	1358	100
Source: pppinindia.gov.in			

Table 4.3 Delayed, Stalled Under construction PPP Projects Since 2014 till 2020

Delayed, Stalled , Under construction PPP Projects from 2014 till 2020			
Sr.No.	Infra Sub Sector	No. of Projects	Cost of Project in Crs
1	NHAI Road Projects	83	86,561
2	State Road Projects	44	46,563
3	Sea Ports	28	38,109
4	Air Ports	3	3,640
5	Social Projects	60	9,325
6	Water & Sanitation	52	9,728
7	Renewable Energy	230	3,28,944
8	Railway	5	8,000
9	Power	20	15,500
10	Urban Transportation	47	21,641
	Total	572	5,68,011
Source : PPPinindia.gov.in,Author's calculation			

4.1.1 Analysis of Delayed, Stalled Under construction PPP

This study has analysed the projects that become operational by 2016 and the minimum of three years of operational and revenue data available for such projects. Many projects were delayed by 9 to 10 years. Officially the projects are called under -construction projects and have not terminated yet.

Delayed Projects

A project delay is a unanticipared deferment of a project due to some events that halted the project's work. It is the time duration for which the project is extended beyond its planned schedule.In delayed project, additional time is required beyond the contracted completion date in the concession agreement.

Stalled Projects

A project becomes stalled when it is still active but for a given reason/s such as litigation and non- availability of land and various permissions, the project cannot make progress/move forward. The word stall implies stopping something that may start again.

The entire list of stalled, delayed, and terminated projects and the projects wise reasons for delay or termination in exhibited in Appendix I and II. Total of 120 NHAI highway projects with an estimated project cost of INR 1, 27,769 Crs were initiated till the end of the year 2016 and were not operational till December 2021, whereas 64 road projects initiated by various state governments in India worth INR 54,155 Cr are still under construction. In the case of seaports initiated by various port authorities, 32 projects worth INR 40,731 Cr were non-operational till December 2021.

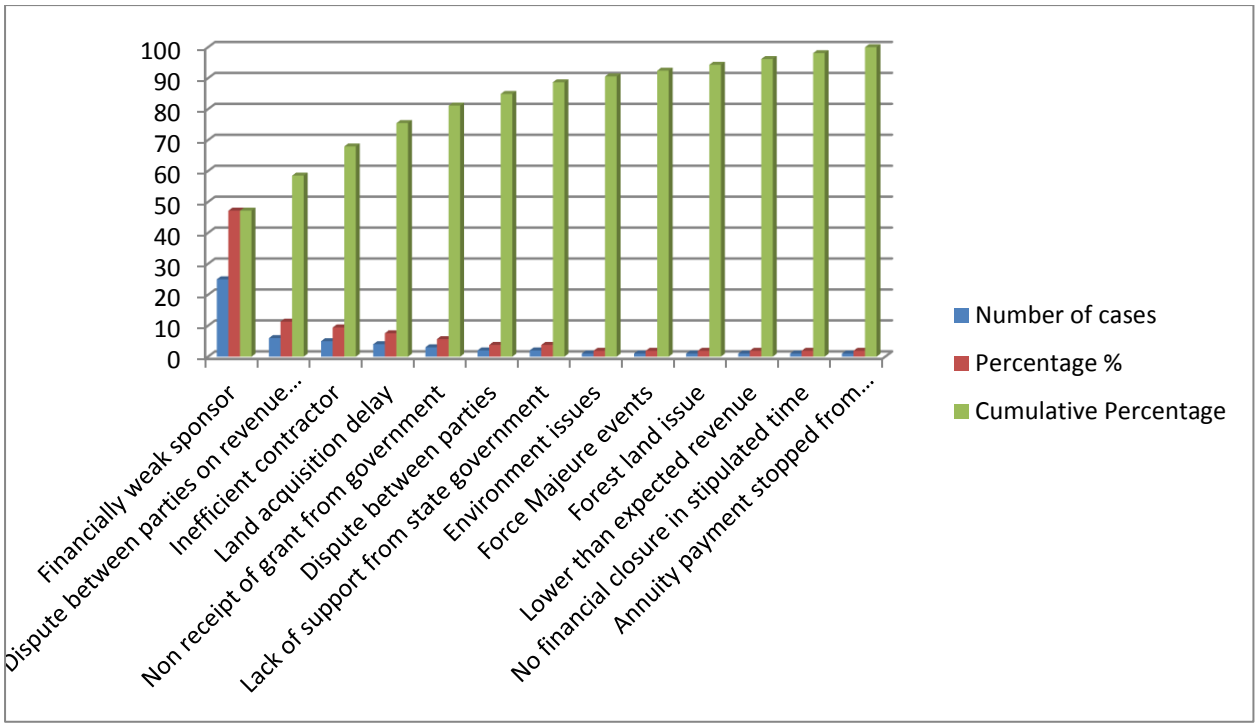
In a sample of delayed and terminated projects, 96 are delayed and stalled under- construction projects and 53 are terminated/cancelled projects. A statistical analysis of the reasons for the termination/cancellation of projects is done. Similarly statistical analysis of the reasons for delayed projects is done which is shown in Table 4.4 and fig 4.2. The data about delayed and stalled PPP projects in Infrastructure is collected through various sources. The reason for the delay of every project is recorded and then the reasons for delayed project at the aggregate level is analysed quantitatively.

Table 4.4 : Analysis of causes of delay of PPP projects

Analysis of causes of delay of PPP projects				
Sr.No.	Reasons for termination	Number of Cases	Percentage (%)	Cumulative Percentage
1	Land acquisition delay	35	36.46	36.46
2	Financially weak sponsor	21	21.88	58.34
3	Dispute between parties	8	8.33	66.67
4	Forest land issue	6	6.25	72.92
5	Inefficient Contractor	4	4.16	77.08
6	Less than expected revenue	3	3.12	80.2
7	Noncooperation by State Government	3	3.12	83.32
8	Legal Dispute between the parties	2	2.08	85.4
9	Environment Issues	2	2.08	87.48
10	Agitation by public	2	2.08	89.56
11	Loss of revenue due to alternative road	1	1.04	90.6
12	Change in government policy	1	1.04	91.64
13	Change in project design	1	1.04	92.68
14	Change in scope	1	1.04	93.72
15	Dispute between the contractor and sub-contractors	1	1.04	94.76
16	Force majeure events	1	1.04	95.8
17	Inappropriate bid with premium	1	1.04	96.84
18	Loss of revenue due to alternative road	1	1.04	97.88
19	Rising price of raw material during operation phase	1	1.04	98.92
20	Policy change by government	1	1.04	100.00
	Total	96		

Source: NHAI, sponsor company's annual reports, Authors's calculation

Fig 4.1: Analysis of reasons for Delayed and stalled PPP Projects



4.1.2 Analysis of Terminations/Cancellations of PPP Project

Some PPP projects were officially cancelled by either the project authority or the private developer due to legal issues and non -complince with the contractual terms. A project is aborted when it can fulfill its intended objectives. A project is cancelled either by the project sponsor, the government authority, or by mutually by both the partners as per the termination clauses depicted in the concession agreement. The financial, operational, risk, and contract management related data of terminated/cancelled PPP projects are presented in this section.

Table 4.5 Terminated PPP Projects

Terminated PPP Projects		
SR.NO.	Sector	Number of Projects
1	NHAI Road Projects	28
2	State Road Projects	17
3	Sea Ports	8
4	Water & Sanitation	10
4	Total	63
Source : PPPinindia.gov.in,Author's calculation		

Table 4.6 Terminated PPP Road Projects

Terminated PPP Road Projects					
Sr. No.	Subsector	Number of projects terminated by the government	No. of projects terminated by the private developer	No. of projects terminated by mutual consent	Total
1	NHAI Road projects	19	8	1	28
2	State Road Projects	13	4	0	17
	Total	32	12	1	45

Source: NHAI, State road authorities, Author's calculation

The data about Terminated PPP projects in Infrastructure is collected through various sources and exhibited in Annexure I. The reason for the delay of every project is recorded and then the reasons for delayed projects at the aggregate level is analysed quantitatively and exhibited in table 4.7. The list of projects terminated by NHAI are exhibited in table 4.8

Table 4.7 Analysis of causes of termination/Cancellation of PPP Projects

Analysis of causes of termination/Cancellation of PPP Projects			
Reasons for termination	Number of cases	Percentage %	Cumulative Percentage
Financially weak sponsor	25	47.17	47.17
Dispute between parties on revenue sharing	6	11.32	58.49
Inefficient contractor	5	9.43	67.92
Land acquisition delay	4	7.55	75.47
Nonreceipt of a grant from the government	3	5.66	81.13
Dispute between parties	2	3.77	84.9
Lack of support from state government	2	3.77	88.67
Environment issues	1	1.88	90.55
Force Majeure events	1	1.88	92.43
Forest land issue	1	1.88	94.31
Lower- than- expected revenue	1	1.88	96.19
No financial closure in the stipulated time	1	1.88	98.07
Annuity payments stopped by the government	1	1.88	100.00
Total	53		

Source: NHAI, State road authorities, sponsors, Author's calculation

Fig 4.2: The reasons for the Termination of PPP Projects

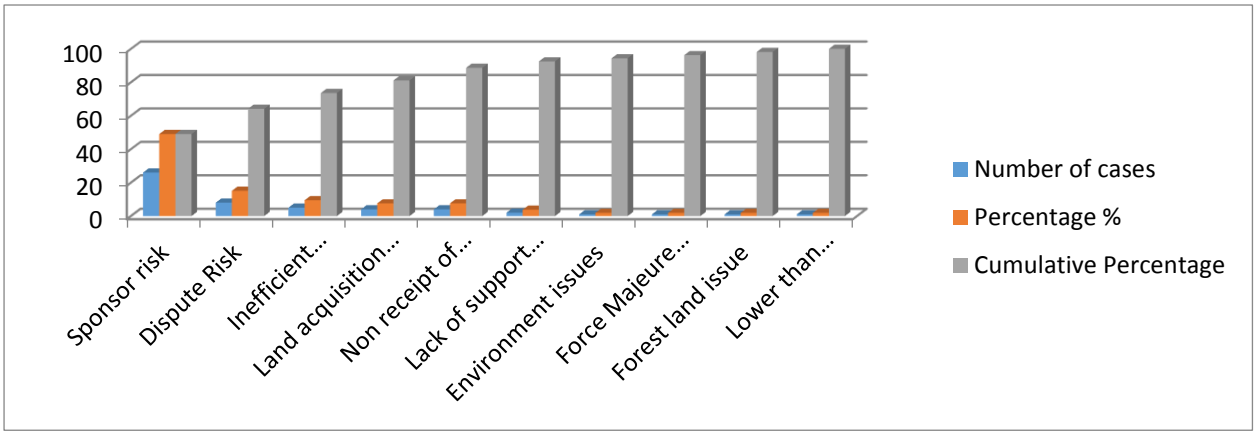


Table 4.8 PPP Road Projects Terminated By NHAI

PPP Road Projects Terminated By NHAI						
Sr.No	State & Division of NHAI	Name of the Firm	Name of the SPV	Name of the Project in brief	Length (Km.)	Date of issuance of Termination Notice
1	Maharashtra	L&T Infrastructure	PNG Tollway Limited	Pimpalgaon- Nashik-Gonde Section of NH-3 CA dated 08.07.2009	60	29.03.2016
2	Tamil Nadu (Port Connectivity Division)	Soma Enterprise Ltd	Chennai Elevated Tollway Ltd	Elevated Road from Chennai Port to Maduravoyal CA dated 18.05.2009.	19	08.04.2016
3	Tamil Nadu	Essel Infra Projects Ltd., - 100%	Essel Walajahpet Poonamallee Toll Roads	Walajahpet- Poonamallee Section of NH-4 CA dated 04.06.2012.	93	22.07.2016
4	Rajasthan	MBL Projects Ltd.	MBL (Udaipur Bypass) Road	Udaipur bypass on Concession Agreement dated 12.08.2016.	23.88	09.01.2017
5	Haryana	VIL Ltd	VIL Rohtak Jind Highway	Rohtak-Jind Section CA dated 07.03.2012.	48.6	23.07.2016
6	West Bengal	Madhucon Toll Highways	Barasat Krishnagar Expressways	Barasat Krishnagar Agreement dated 20.06.2011.	84	03.05.2016
7	West Bengal	Hindustan Constriction Company	Raiganj Dalkhola Highways Ltd.	Raiganj- Dalkola Concession Agreement dated 28.06.2010.	55	31.03.2017
8	Gujarat	IDFC Project Ltd.	Jetpur Somnath Tollways	Jetpur- Somnath, Concession Agreement dated 05.02.2011	123.45	10.11.2016
9	Bihar	Gammon Infrastructure Projects Ltd.	Patna Buxar Highways Ltd.	Patna-Buxar Section & Ara Bypass CA dated 02.02.2012	124.8	29.08.2014

10	Bihar	Abhijeet Infrastructure	Abhijeet Bihar Roadways	Chhapra-Gopalganj on CA 06.06.2011.	94.25	05.05.2014
11	Odisha	KSS Petron Pvt. Ltd.	Bhubaneshwar Expressways	Bhubaneshwar-Puri on CA dated 30.07.2010	59.9	20.03.2017
12	Odisha	Corson Corviam	NA	Talcher-Duburi-Chandikhole CA dated 27.01.2015	132.35	15.03.2017
13	Karnataka	Transstroy (India) Ltd.	Transstroy Hoskote-Dobbaspet Tollways	Hoskote-Dobbaspet,,Concession Agreement dated 30.08.2012	80.02	19.05.2017
14	Madhya Pradesh	Transstroy (India) Ltd.	Transstroy Obedullaganj Betul Tollways	Obedullaganj-Betul Section, Concession Agreement dated 03.04.2012	121.36	18.10.2016
Source : NHAI						

4.1.3. Qualitative Analysis of Delayed, Stalled, and Terminated PPP projects using Case studies

PPP project cases are analysed to get insights into a sequence of events and the issues faced by PPP projects in India. These case studies provided deeper insights these case studies focused on the key issues in the projects, discusses significant aspects of the projects, and aided comparative study focusing on qualitative aspects of risk and contract management of PPP projects.

C1. Seven Hills Hospital in Mumbai-A case of failed PPP project in the healthcare sector

Background

The health services for people in Mumbai city with a population of 1.26 crore are met through Hospitals and dispensaries run by the Municipal Corporation of Greater Mumbai (MCGM), Maharashtra and the private sector. The MCGM has a network of four medical colleges cum hospitals, one dental college cum hospital, 18 general hospitals, seven specialty hospitals, 30 maternity hospitals, 180 dispensaries and 190 health units. In 2002, a private hospital chain Seven Hills and MCGM started talking to open a multi-specialty hospital in Mumbai on a PPP basis. The proposed 1500 bed was conceived as the largest private sector hospital. In Asia.

Seven Hills Hospital Group

Seven Hills Healthcare was founded by Dr. J.D. Maganti in 1980, currently working as managing director of the group with a portfolio of three private hospitals, in Mumbai and Visakhapatnam in Andhra Pradesh state. The Vishakapatnam hospital was opened in 1987 and the Mumbai hospital in 2010.

Mumbai Hospital

The Mumbai hospital was built on the land 18 acres with a built-up area of two million and with the capacity of 1500 beds out of which 300 are for critical care. The Mumbai hospital was equipped with 35 ICUs and 40 specialty rooms. In 2011, the hospital launched a "Save a Heart" program for poor children with heart defects. The film actor donated INR 1.5 million to this program. The British Deputy High Commission donated a Diabetes on wheel unit to the hospital which was later named after actor Amitabh Bacchan who worked as brand ambassador for the hospital for the cause of diabetes awareness.

PPP Contract Details

According to the contract signed in 2005, BMC offered the private developer, Seven Hills, a 70-year lease on an 18 acres plot in Andheri, a Mumbai suburb, near the Mumbai Airport. In return, Seven Hills was compiled to set aside 300 beds out of total of 1500 beds for financially weak patients referred by BMC hospitals and treating them at government hospital charges.

The funding of the project

The project was funded by private equity and bank debts. Dr.Jitendra Maganti, the founder and managing director of the seven Hill hospital group was the major shareholder. JPMorgan's private equity arm bought a 30% stake in the company with an investment of 75 million dollars in 2008 and further invested 50 million dollars in 2013.

Inaguration

The Mumbai hospital was inaugurated by the president of India in August 2010. A controversy arose as the beds to be reserved for low- income patients as per the concession were not ready by that time.

Financial difficulties and controversy

In the first phase, 300 beds were ready but the beds for BMC patients were not ready. As per concession, the private partner was not allowed to expand the beds till they make beds available for the poor patients. The BMC denied signing the MOU required for building further beds, the matter reached the Mumbai high court in 2012.

The private decided to provide 300 beds to financially challenged patients and supply them with medical services at BMC rates. As per contract terms, BMC was authorized to take over the charge of the hospital in case of breach of these terms. Based on this agreement, BMC provided the occupancy certificate to the hospital.

Due to a delay in the expansion in number of beds and a fall in revenue, the private partner was facing a severe cash crunch and debt service problems in 2012. The private partner restructured its INR 14 billion debt from a consortium of banks including Aix, Union, Canara, and Allahabad bank.JPMorgan Chase, through its Asia Infrastructure Fund, invested INR 3 billion in Seven Hills. The lenders also restructured the debt of 8 billion. Dr Maganti was still the controlling shareholder in the company.

In 2014, Dr. Jitendra Das Maganti and the investor JPMorgan decided to jointly sell their majority stake in the hospital chain. They appointed Goldman Sachs to scout for a strategic investor to make the company bigger. Global strategic investors from Africa, Indonesia, Japan

.and Malaysia were interested in the property of the hospital chain along with the private equity investors.

In 2015–16, Seven Hills was operating at only 20% capacity registering revenue of 2.5 billion and a loss of 1.5 billion. Seven Hills said in its annual report, "The current level of operations cannot manage the fixed overheads of Mumbai hospital. The time and cost overrun of Mumbai hospital have created cash flow and liquidity problems". In 2017, only 300 beds were operational in the Mumbai hospital

The Mumbai High Court ordered the hospital to repay its loan by March 2017. The equity partner, JP Morgan first tried to sell its stake and then gain the controlling stake in the company. The lenders filed for insolvency in 201 and auction of the hospital. The total liability towards lenders was 13 billion.

Insolvency plea against Seven Hills Hospital

The consortium of bankers led by Axis bank filed for insolvency after all the efforts to restructure the company through strategic and financial investors in November 2020. The bankers also made provisions for bad debts.

The stressed funds Avon of ICICI Bank and Bain-Piramal submitted their bid but were rejected by the lenders. Reliance Industries Ltd. also offered to buy the controlling stake in the company but failed to do so.JP Morgan, also tried to acquire 51% shares of the company pledged with the banks but could not do it due to paucity of funds.

The corporate insolvency resolution process (CIRP) against the hospital chain was approved in April 2018. The lenders made claims of 16 billion of which 13.5 billion claims were admitted.JM Financial Asset Reconstruction Company had bought out the loan exposures of banks and file a claim of 9 billion. Union Bank claimed 1 billion and State Bank of India claimed 0.85 billion.

The Seven-hills was declared bankrupt by the Hyderabad Bench of the National Company Law Tribunal. The Supreme Court overruled the Hyderabad bench of the National Company Law Tribunal (NCLT) order accepting the resolution plan submitted by Shetty's New Medical Centre (SNMC). The resolution plan to pay off the financial and operational creditors was INR 10 billion to be funded by borrowings.

The Supreme Court's stance critical to PPP modality

The municipal corporation initially approved the resolution plan but then changed its stance and demanded to treat it as a financial debtor due to non-payment of rentals for the land provided to the private partner. The Supreme Court upheld the arguments of the Mumbai Municipal Corporation.

The Supreme Court said in its verdict that the land given by Municipal Corporation to the project was public property and the proposed resolution plan in NCLT is against the corporation's plan to provide medical facilities to the weaker section of the society

The current situation

In 2020, Seven Hills Hospital in Mumbai was converted into the biggest dedicated Covid-19 facility by the Mumbai municipal corporation which was managed by the Reliance Industries group.

Analysis

The project failed due to a dispute between the two parties, time and cost overrun resulting in the mounting debt burden on the private partner and bankruptcy, operational mismanagement, and various hurdles due to the municipal rules and regulations. Table 4.9 exhibits the Contract and Risk Management matrix of the Seven Hills hospital PPP project.

Table 4.9 Contract and Risk Management matrix of Seven Hills hospital PPP project in Mumbai

Contract and Risk Management matrix of Seven Hills hospital PPP project in Mumbai			
Type of Risks	**Project Sponsors**	**Government Authority**	Output
Predominant risk assumption by sponsors/lenders/contractors			
Construction	Project ownership, Turnkey EPC contract , Development Expertise, Resource Development	Granting of permits/consents and 21 acres of land in Mumbai	The construction could not be completed. Very high time and cost overrun
Technical Aspects	Completion of project on time and within the budget	None	Only 300 beds out of the proposed 2100 beds were installed
Funding Risk	Financial Closure	None	Final closure has done but not adequate, financial distress, the sponsor went to NCLT due to bankruptcy of the sponsor
Macroeconomic Risk	Hedging against Interest rate fluctuations	BMC to pass-through treatment cost to patients	Issues in debt servicing and accumulation of interest charges
Predominant risk assumption by host government/off-taker			
Forex Risk	Hedge foreign exchange rate fluctuations	Fiscal policy, Forex Reserve	Hedged
Inflation	Indexed contract	Off-taker ability to pass on price hikes	Inflation increased project cost

Facility's performance	Quality treatment	Covering poor patients cost of treatment	The project was not completed
Political Risk	insurance against Political risk	Local policy	No political risk observed
Shared risks			
Medical Consumables & equipment availability and prices	Control Medical Consumables and equipment	Control of local Medical Consumable,	All licenses in place
Contractual Risk	The contractual provision of providing 300 beds to poor citizens could not be full filled & dispute between the two partners	None	The court gives a verdict in favour of BMC, the authority
Operational Risk	Operational mismanagement	Various hurdles due to the municipal rules and regulations.	The project was delayed by 6 years resulting into cost-overrun

C2. Airport Metro line project

Background

Since liberalization and privatization in 1991, the arrival of private airlines and low-cost airlines in aviation has made air travel popular in the country with proliferation in services and falling airfares. It has become very easy to get an air ticket without any hassle even at the last minute before the journey. While air ticket prices are in the same band as a first-class rail tickets, it is indeed difficult to get a rail ticket without booking in advance. That increases the number of air travelers from 40 million in 1995 to 90 million in 2006.

But this exponential rise in air travel leads to congestion on the routes towards the airport. Also results in long queues at airport terminals and missing flights. Hence the city transportation services striving to decongest the roads to the airport. Delhi housing the busy airport, experienced a rise in air passengers from 8 million in 1995 to 20 million in 2006 out of which 0.1 million passengers including those using their own vehicles and airport employees using the airport road. The public transport in the form of a few city buses was for reaching the airport that too on the way.

Delhi became the capital of the British Empire in 1911 and then it was developed as the New Delhi complex housing all prominent government buildings. The Gurgaon and Noida cities to the south of New Delhi were then packed with residential complexes. A new commercial complex was also developed nearby the airport. The explosion of population in all these locations builds pressure on the transport infrastructure of the city. By 2008 the number of vehicles numbers increased to 12 million with 90 cars per population of 1000.

Delhi Metro

A Delhi metro was conceived in 1995 to address the transport issues in the city. A new company Delhi Metro Rail Corporation (DMRC) was formed to implement the project with equal equity contribution from the central and Delhi state governments.By 2008 Metro build infrastructure covering route of 130 km carrying one million passengers every day which was almost 10% of the total ridership in Delhi.

Delhi's metro was built on time and budget with services of international standards without resorting to any subsidies from the government and becoming financially self-sufficient. The Managing director of DMRC, Mr.Sreedharan was credited with the success of the Delhi Metro for his excellent leadership and vision.

Delhi Airport Metro Express Limited

DMRC decide to build a high -speed metro line to address the congestion issues on the airport road. The proposed metro line was 25 km and had six stations for providing faster transportation to the airport covering the fast growing residential area, Dwarka, five km from the airport. The was decided to be completed before the Commonwealth games hosted by India in October 2010.DMRC decided to adopt public- private partnership (PPP) with a concession period of 35 years for this project.

The worldwide experience in terms of financial returns to the private concessioner was hardly 2 to 3 % even negative in some cases. Hence DMRC decided to part finance the civil work of building tunnels and viaducts to ensure optimum returns for the private partner. The private partner was assigned the responsibility of financing rolling stock, signals, electricity network and operating expenses. The estimated cost of the project was 16 billion before the bidding. The parameter set to select the private partner will demand the least subsidy from the authority.DMRC forecasted traffic of around 50000 every day on the route and grow to 90000 in a decade.

The project details

The Delhi airport express rail link operates from the airport to Dwaraka covering a 23 km route. The construction period for the project was 28 months completed in February 2011. The line reduced travelling time to mere 20 minutes from the earlier two months on the congested route.

The winner from international competitive bidding, Reliance infrastructure formed a special purpose vehicle (SPV), Delhi Airport Metro Express Private Limited (DAMEPL) to implement and maintain the project. The project was awarded 35- year BOT mode of PPP in 2008. On a revenue sharing basis.DMRC constructed tunnels, viaducts, and rail-station infrastructure while DAMEPL designed, financed , and constructed infrastructures such as rolling stock and power-signaling-communication infrastructure of the rail route.

The project cost was shared equally between DMRC and DAMEPL. The project was financed through a mix of debt and equity. The loan was given by an Axis bank- led consortium of eight banks. The lenders gave debt of INR 23 billion, higher than the 13 billion approved as per government guidelines.

The issue in the project

DAMEPL terminated the concession blaming DMRC to create defects and not curing them in their construction work and delaying the handing over of the project by six months impacting the financials of the concessionaire. The efforts to resolve the issues mutually failed. The concessionaire stopped the work in June 2013 and handed over the project to DMRC demanding the termination payment. DMRC rejected the demand and instead imposed a fine of INR 8 billion on the concessionaire and then approached the arbitration panel in September 2013.

DAMEPL's blamed the structural defects in the viaduct through which the train would run and stopped operating the airport line, withdrew from the contract and invoked the arbitration clause. Since then DMRC is running the airport line.

The arbitration tribunal uphold the claim of DAMEPL's claim that to keep running the airport express line due to construction defects was unsafe. This verdict was reversed when DMRC filed the appeal against the earlier award. In April 2018 Delhi High court ordered DMRC to pay 100% the debt and 120% of equity to DAMEPL due to the fault of DMRC.

DMRC challenged in March 2018, a single judge order upholding an INR 52 billion arbitral awards, including interest of nearly INR 20 billion, in favour of DAMEPL in connection with the Airport Express project. It questioned DMRC if wanted to pay or take over the INR 18 billion owed by DAMEPL to the 12 banks which had given the debt to the project.DAMEPL replied that apart from the INR 18 billion owed to 12 banks, they had infused additional INR 25 billion which too the DMRC should take over.

In March 2018, the high court ordered DMRC to help DAMEPL in terms of debt servicing to keep it afloat. The Supreme Court discarded the review petition filed by DMRC in 2020 and ordered it to pay 71 billion towards the termination payment to DAMEPL.

Analysis

The project faced time and cost overrun, completed in 2011, missing the deadline of completing the project before the commonwealth games. The ridership and real estate estimates proved faulty deviating from reality. The Ridership figures never crossed 10,000-15,000 per day as against the estimate of 45000.RelianceInfrastructure failed in monetizing the real estate. While others bidders demanded a subsidy, Reliance Infrastructure offered a premium to DMRC to get the project which eventually impacted the revenue. This points towards aggressive bidding from the concessionaire.

The partners had a dispute over the construction period, deadlines, ridership estimates, and quality of civil construction work by DMRC.DMRC claimed that the private partner rejected the project due to financial non-vialbility while DAMEPLclaimed that DMRC promised to repair defects in three months but the actual repairs took more than six months impacting the financials of the concessionaire and used this as a reason to abandon the project.

IDFC and other banks provided debt of INR 16 billion in the name of refinancing without adeqiuate due diligence is also observed in this project and finally losing the depositor’s money.

C3. Chennai Port—Madura

The background

Chennai Port is a major port located on the East Coast of India. The container movement on the road created severe congestion distressing the common commuters. To bring down the congestion on this road due to trailers and containers in the highly populated locality and ease the city traffic by building an elevated express.

Tamil Nadu state approved the project in 2007. The project was officially started in March 2008. In January 2009, the Prime Minister of India set down the foundation stone for the expressway.NHAI decided to build the elevated road spanning a total length of 19 km on a build, own, and transfer (BOT) mode under Phase VII of National Highways Development Project (NHDP) . It was planned to be the longest elevated corridor project in India.

Project Details

The Chennai Port – Maduravoyal Expressway is a stretch of 25 km with six lanes, an elevated expressway connecting the Chennai port to Maduravoyal. The expressway moves along the Cooum River and NH4 national highway.

The Detailed project report was prepared by Wilbur Smith Associates. Soma Eenterprises Ltd. was awarded the project after international competitive bidding in 2009. The concession agreement was between NHAI and Soma Enterprise signed in May 2009 and the construction work commenced in September 2010. The targeted date of completion was fixed at September 13, 2013, with an estimated cost of 1655. The project received environmental clearance in February 2011. Of the total project cost of INR 16.55 billion, INR 3.10 billion was utilized for land acquisition and rehabilitation of affected people.

The issue in the project

The project faced opposition from local farmers due to the nearness of the Cooum river bed area to the project site and the construction of pillars on the river. Only 15% of the project work was completed till 2011.

In 2011, in a state election, AIADMK won the majority and J Jayalalithaa was sworn in as chief minister of Tamilnadu. The State's Water Resources Department raised objections on the road project claiming to state that the pile caps constructed for the project obstructed the free flow of water in the Cooum River. The Water Resources Department ordered the NHAI to stop work alleging deviations in the alignment which halted the project construction. The construction was re-started in 2013, but could not made progress due to acquisition of the land. This mandated NHAI to pay for idle labour and equipment charges. In 2014 Madras High Court ordered the state government to extend full cooperation to NHAI for fast completion of the delayed project. The matter could not resolved till 2015.

In December 2016, the Tamilnadu state government signed a state support agreement (SSA) and requested the central government to carry out a feasibility study for realignment. The state government suggested NHAI avoid twin columns on the Cooum River to minimize the environmental impact and suggested a single pier column.

The Fresh tender for the Chennai Port-Maduravoyal elevated expressway was refloated in 2018. The cost of the project increased from INR 18 billion to INR 28 billion. Larsen & Toubro redesigned the project in 2019. The navy decided to give its 14000 square metesr of land to be compensated by the Chennai port to complete the project.

Analysis

All the stakeholders were affected financially due to stranded project work, which was already done before the termination of the project. The project has been stalled for the last eight years. The project cost has been revised by the NHAI from INR 18 billion in 2013 50 to INR 50 billion in 2021.

C4: Kishangarh–Udaipur–Ahmedabad Highway: failure of NHAI's biggest road project

Background

The NH-8 Delhi and Mumbai part of the DMIC project has a very high commercial and tourist traffic linking the Jawaharlal Nehru Port and the Mumbai-Pune express highway.Kishangarh–Udaipur-Ahmedabad is one of the busiest routes in Delhi Mumbai industrial corridor and hence NHAI decided to already existing four-lane highway to a six-lane highway.

The Public Private Partnership Appraisal Committee (PPPAC) suggested bidding the project for INR three billion premium, the NHAI was expecting over INR four billion annually with a 5% increase every successive year, from global infrastructure majors participating in competitive bidding of the project.

In competitive internal bidding , The six-lane project was awarded on PPP basis by the NHAI to the private developer GMR Infrastructure at a project cost of 77 billion in 2011 offering the highest premium of INR 6.5 billion annually to NHAI for 26 years, much higher than NHAI expectation.

Project Details

The project SPV secured loans of INR 5.5 billion in May 2012. The equity requirement of the project was $1.6 billion.Of the INR 60 billion project cost, INR 6.5 billion was to be spent on land acquisition, rehabilitation and resettlement, and preconstruction purposes.The cost of the Kishangarh-Udaipur-Ahmedabad highway was more than the combined cost of all other nine projects of GMR Infrastructure.

But the banks started demanding 100% availability of land before they start disbursing the loan and were not ready for prevalent norms of 80% land availability for lending. The banks had already exhausted their sectorial investment cap for infrastructure.

The issue in the project

In 2012, GMR Infra terminated the contract stating failure on the part of NHAI to get environmental clearances for the project and to notify the revised toll rate on this stretch being widened from four to six lanes.

NHAI had rejected GMR's termination notice, saying this move was based on flimsy ground and was factually not correct. NHAI made efforts to revive the project but failed to do so. And

finally approved the termination of the contract. In July 2015, the Delhi high court dismissed the petition of GMR challenging NHAI's move to invoke the bank guarantee of 2.7 billion. In 2016 NHAI split the projects into five stretches of around 100km and rebid the projects. The projects were done using a Hybrid Annuity model (HAM), Annuity, and EPC basis.

Analysis

The case promulgates aggressive bidding by the developers. It was awarded on a premium basis. The Highest ever premium was offered for this stretch. The premium is a payment made by the developer to NHAI in build, operate, and transfer (BOT) projects. The failure to arrange the required debt and equity by the developer points out that the developer did not do the due diligence on the financial viability of the project. After winning the contract, GMR realised the problems in paying a large premiums due to bad macroeconomic conditions.GMR left the project mentioning the delay in obtaining environmental permissions.

NHAI failed to obtain Environmental Clearance which resulted in a delay of handing over land and failure in discharging its duties and hence three partnesr opted out of the project. The projects should not be floated without all clearances and land in hand.NHAI lost premium revenue of INR 6.36 billion annually for 26 years. The developer had staggering debt of around INR 3400 billion, at the time of financial closure. Based on the experience of such projects, the government deferred the premium of 13 such projects to review such projects.

C5: Ranchi Expressway Ltd

Project details

NHAI) conceived a four-lane 163-km road on NH-33 from km 115 km to 278km under NHDP Phase III, connecting Ranchi to Jamshedpur in the state of Jharkhand to decrease the pressure of Traffic in both cities in 2010.

The contract was signed between NHAI and Madhucon Project Ltd on March 18, 2011. Ranchi Expressways Limited (REL) was incorporated as a special purpose vehicle (SPV) by the promoters Madhucon Infra Limited and Madhucon Projects Limited to execute the project on DBFOT) basis.

The financial Closure

With an estimated cost of INR 17 billion for the project, a consortium of 15 banks led by Canara Bank agreed to fund INR 11.5 billion. The promoters had to infuse 25 percent of the total project equity contribution i.e. INR 1.2 billion before the initial drawdown date as per the contract with the banks.

The issue in the project

The high court based on the investigation of the serious fraud investigation office ordered inquiry into the delay of the project that started in 2012(Source1). The SIFO report alleged that the promoters and directors of Ranchi Expressway, Mr. Srinivasa Rao, Mr. N Seethaiah and Mr. Prithvi Teja had round tripped INR 0.5 billion, diverted INR 0.25 billion, claimed INR one billion as maintenance and used INR 0.94 billion as advance. The total amount of fraud was 2.7 billion.

Based on the SFIO report, Central Beauro of Investigation registered an FIR against Ranchi Expressway Ltd's Chairman and Managing Director, its directors, Madhucon Project Ltd, Madhucon Infrastructure, Madhucon Toll Highway Ltd, auditing firm named 'Kota and company' and officials of Canara bank for releasing INR 10 billion without verifying the progress of the project (Source 2). The CBI arrested the promoters of Ranchi Expressway Ltd, including its CMD K Srinivasa Rao, for allegedly causing a loss of over INR 10 billion to a consortium of banks led by Canara Bank in March 2019.

The directors were alleged to draw down INR 10 billion from the banks without infusing their equity as per the lending agreement and then diverting those funds without using them for the said project.Since no progress was made on the project, the project debt turned down to be NPA in 2018. Hence NHAI terminated the project in 2019 as per the concession agreement terms and forfeited the bank guarantee of INR 0.75 deposited by the developer with Canara Bank. The Enforcement Directorate raided the offices of the promoter of the project Madhucon Group in June 2021.

Analysis

The case is an example of opportunism and fraudulent practices adopted by the private developer and the involvement of bank officials in the scam. Such projects results in the privatization of profit and nationalization of the losses.

Reference

1) In the highcourt of Jharkhand at Ranchi W.P.(PIL) No. 3503 of 2014,The Court on its Own Motion Vrs. The Union of India & others with W.P.(PIL) No. 2470 of 2015,The Court on its Own Motion Vrs. The State of Jharkhand & others

2) CBI registers case in Ranchi-Jamshedpur (NH-33) project fraud, https://www.aninews.in/news/national/general-news/cbi-registers-case-in-ranchi-jamshedpur-nh-33-project-fraud20190312234030/

Section B

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4.2 Quantitative Analysis - Calculation of financial returns of operational PPP project using a hypothetical financial model

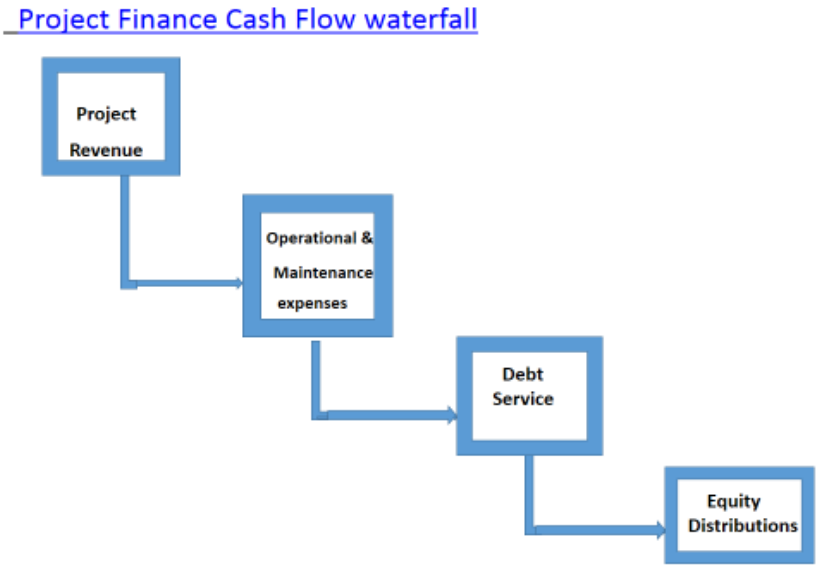
This study employed an Excel-based financial model as an analytical instrument to carry comprehensive financial and economic analysis of 170 Operational PPP projects in India over their economic useful life by calculating the financial returns of these projects. This model is built to measure key financial performance indicators of the operational PPP projects from the detailed analysis of project cash flows. The model calculates an equity and project NPV and equity and project IRR. The model analysis demonstrats the financial returns to key project stakeholders.

The private capital in the PPP model is arranged through project finance where the debt is provided by the lender to economically independent project SPV based on the strength and certainty of the future cash flow in the form of off -balance sheet on a non-recourse basis rather than the corporate balance sheet of the project developer. The bankability of such projects depends on the sound allocation of risk among the parties and the viability of the project

depends upon the ability to pay interest and repay the principal to the lenders and provide optimum financial returns to the equity providers.

Project Finance Cash Flow Waterfall

Fig 4.3 Project Cash Flow Waterfall



The methods used to calculate the financial returns of the projects

1) Payback Period Method

A Payback Period is a time to recover the investment in the project. The method is used for the initial screening of projects to find how long it will take to cover project cost. The shortcoming of the method is that it ignores the cash flows producing unviable outcome. It ignores the timing of cash flows which results in rejecting projects with late cash flows.

2) Net Present Value (NPV)

NPV is discounted sum of the expected future cash flows by applying Discounted Cash flow method and considers the time value of money. The discounting rate is a required rate of return. The present value of total cash inflows is compared with the present value of total cash outflows. The difference between the cash flows decides if the project is to be accepted or rejected.

3) Internal Rate of Return (IRR)

IRR measures the project's annual rate of return on invested capital. The word internal means the cash flows which remains internally invested in the project and gets added at the end of project life.IRR is the interest rate, for the sum of cash flows discounted at WACC.

External Rate of Return (ERR/MIRR)

The External Rate of Return (ERR) applies the discounted cash flow method to calculate project returns by reinvesting at the calculated IRR. MIRR method face challenges of getting real- time discount rates and reinvestment rates .Hence practitioners and academia, preferred IRR over the MIRR hence NPV and IRR are used in this study to measure the financial returns of operational PPP projects.

Calculation of Unlevered Beta / Asset Beta

Unlevered beta or Asset Beta is the beta calculated without referring to financial leverage. It compares the risk of a debt-free company with the market risk.to the risk of the market. The volatility of a deb-tfree company refers to the volatility of its assets.

$Beta_{Asset} = Beta_{Equity} / [1+ (1\text{-}Tax\ \%)*(Debt/Equity)]$

Levered beta informs investors how sensitive asecurity toward the macro-market risks.

The formulas for un-levering and re-levering Beta:

$Beta_{Levered} = Beta_{Unlevered} *(1+ ((1\text{-}TaxRate)*(Total\ Debt/Equity))$

Hypothetical Financial Model

A hypothetical financial model is designed to calculate the financial returns of the operational projects and various infra subsectors in India from 2001 to 2020. The financial and operational data of all the projects were collected. The sample consists of 170 operational projects spanning roads, ports, airports, hydroelectric power plants, and metro rail projects in India. The revenue, cost, debt, interest and depreciation. etc. of all the projects are collected from various sources for each project. The financial model uses this data to calculate the Project NPV and IRR and equity NPV & IRR of each operational project. The financial models of all 170 operating projects were developed individually to calculate the financial performance of the PPP projects.

Mark Hellowell (2012) developeda financial model to calculate equity returns of PPP hospital projects built by the National Health Service organisation on a Design, Build, and Finance and Operate basis in the U.K. The reference betas in this financial model are taken from comparable listed construction companies. The equity beta of comparable companies was unleveraged to calculate asset/project- specific beta. The market risk premium is assigned equal to that at the time of financial closure.

PWC and Frank J. (2002) calculated the project return of 64 PFI projects in UK. They calculated IRR by computing the FCF of project and the WACC of the project and the cost of equity was calculated using CAPM formula. The Betas were calculated by using return data for UK water and gas utility companies. The spread between project IRR and WACC was calculated as 2.5%. The Equity IRR was high as equity was only 10% in the capital structure. Mohammed Ali Berawi et al (2018) calculated the Equity IRR of 15.5% for Walini city .a Technology Park in Indonesia on a PPP basis using the financial model. The framework used to build the financial model for this study is as follows:

The Capital Asset Pricing Model (CAPM) is referred to calculate cost of equity. The cost of debt is calculated by addinga premium of 550 bps (Risk premium of BBB- rated companies usually observed during the financial closure of the project (Golknath 2014) to 10-year GSEC rate for the year of financial closure of the project. Using this cost of debt and equity WACC is calculated. The equity betas compiled of the listed companies were unlevered to calculate the asset beta. Further Free Cash flow to equity (FCFE) is calculated and discounted by Cost of Equity to get Equity IRR (EIRR) and Free Cash Flow to Firm (FCFF) is discounted by WACC to get the project IRR (PIRR).

In the CAPM model, the cost of capital for a company is calculated by adding the return associated with a zero-variance asset like government bonds and a premium for the amount of systematic risk which is $Ri=Rf + \beta (Rm-Rf)$ where Ri is the expected return on investment, Rf is risk free asset return such as 10 years Government bond yield, β measures the covariance of returns on investment with market portfolio divided by the variance of the latter, and Rm is the return on the market index. CAPM is used by many corporate financial managers internationally (Graham and Harvey 2002) and it is a starting point for calculating return to equity investors.

The risk -free rate (rf) is calculated as the yield on Indian government bonds maturing in 10 years at each project's financial closure date. The market risk premium (rm – rf) is measured as the arithmetic means of emperical market index returns of the National Stock Exchange (NSE) in India for the duration 1996-2017. Betas for the listed construction companies are gathered from Bloomberg.

4.2.1 Illustration of Financial Model

Calculation of Equity IRR and Project IRR of IRB Tumkur Chitradurga Tollway using Hypothetical Financial Model

Calculation of Risk Premium (Rm - RF)

The following methodology is used:

For the duration from 2001 to 2017

A) The yield of 10- year Government bond issued in that year of financial closure is referred to.

B) Annual Return of NIFTY of NSE referred for Marker rate RM for that specific year.

C) The average risk premium is = 10.77%

Table 4.10 Betas of Listed Road Construction companies and sponsor of PPP Projects

Betas of Listed Comparable companies and sponsors of PPP Projects		
Sr.No.	Company	BETA
1	HCC Ltd.	1.81
2	Larsen & Toubro	1.58
3	Engineers India Ltd.	1.31
4	Jaypee Infratech Ltd.	1.15
5	Anant Raj Ltd.	1.94
6	Reliance Infra Ltd.	1.57
7	GMR Infra Ltd	1.77
8	IL&FS Ltd	2.61
9	IRB Infra Ltd	1.42
10	Gammon Infra Ltd	1.26
11	Ashoka Builtcon Ltd.	0.55
12	GVK Power Ltd	2.55
13	NCC	1.77
14	Sadbhav Engg Ltd.	0.82
15	KNR Ltd	0.94
16	Supreme Infra Ltd.	2.16
17	Patel Engg Ltd.	1.31
18	Atlanta Ltd.	2.34
19	Ramky Infra Ltd.	2.14
20	Gayatri Projects Ltd/	0.55
	Average Beta of Comparable Companies	1.5765

Source: Bloomberg

Table 4.11 Risk Premium (Rm-Rf) Calculations

Risk Premium (Rm-Rf) Calculations			
Year	GSEC %	NIFTY Return	Risk Premium (%)
2001	9.39	-16.2	-25.59
2002	7.40	3.3	-4.10
2003	7.27	71.9	64.63
2004	7.37	10.7	3.33
2005	7.30	36.3	29.00
2006	7.56	39.8	32.24
2007	7.99	54.8	46.81
2008	5.69	-51.8	-57.49
2009	7.28	75.8	68.52
2010	7.80	17.9	10.10
2011	8.79	-24.6	-33.39
2012	6.84	27.7	20.86

2013	8.83	6.8	-2.03
2014	7.35	31.4	24.05
2015	7.72	-4.1	-11.82
2016	6.79	3	-3.79
2017	6.79	28.6	21.81
AVERAGE	7.53	18.31	10.77

Source: RBI, NSE

Table 4.12 Operational Details of IRB Tumkur Chitradurga Toll way Road Project

1	Project	Four laning of Tumkur Chitradurga road in length of 80 km under NHDP-III
2	SPV name	IRB Tumkur Chitradurga Tollway Private Limited
3	Sponsor	IRB
6	Date of Concession Agreement	16-Aug-10
7	Date of Financial Closure	5-Nov-10
8	Date of Appointed of contractor	4-Jun-11
9	Construction Completion Date (as per Concession Agreement)	1-Dec-13
10	Date of Construction Completion	16-Feb-14
11	Last date of Concession	15-Aug-36
12	Concession Tenure	312 MONTHS (26 YEARS)
13	Projected Project Cost INR Crore	839 Cr
14	Actual Project Cost (INR Crore)	1260 Cr

Source: www.infrastructure.gov.in, IRB

Calculation of Project IRR & NPV and Equity IRR & NPV

Step 1: Calculating Unlevered Asset Beta

Unlevered Asset Beta = Levered Beta of comparable listed companies*E/D+E

=1.57(155/ [155+1105]) =1.57*0.1230=0.1931 [[Debt = 1105 Cr and equity = 155 Cr]] =0.1931

Step 2: Calculating Levered Asset Beta

Asset Beta $_{\text{Levered}}$ = Beta $_{\text{Unlevered}}$ * 1+ (1-Tc) *D/E

= 0.1931*(1+0.65*5.63) = 0.1931*5.63 = **1.08**

Step 3: Calculating Cost of Equity

Cost of Equity = Rf + Ba (Rm-Rf) [CAPM model] = 7.28 + 1.08(10.77) =7.28+11.63= 18.99

Cost of Debt = GSEC yield + 550 bps = 7.28+5.5=12.78 [[RF for year 2010 = 7.28% (Financial closure year 2010) Rm-Rf= 10.77 (table)]]

Step 4: WACC of the project

WACC= E/ (E+D) * Cost of equity + D/D+E (1-Tc)* Cost of debt = 9.62

Step 5: Calculation of FCFF and FCFE

Step 6: Calculation of Project NPV & IRR and Equity NPV & IRR

Table 4.13 Financial Model of IRB Chitradurga Tumkur Tollway

Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
T	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Capital	-1260																							
OR		188	207	225	248	273	300	330	363	399	439	483	531	584	643	707	778	855	941	1035	1138	1252	1377	1515
OE		18	19	20	21	22	23	25	26	27	28	30	31	33	35	36	38	40	42	44	46	49	51	54
OP		171	188	205	227	250	276	305	337	372	410	453	500	551	608	671	739	815	899	991	1092	1204	1326	1462
INT		218	208	198	189	179	170	160	150	141	131	121	112	102	93	83	73	64	0	0	0	0	0	0
GP		-47	-20	7	38	71	107	145	187	231	279	331	388	449	515	588	666	752	899	991	1092	1204	1326	1462
DPR		53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53
PBT		-100	-73	-46	-15	18	54	92	134	178	227	279	335	396	463	535	613	699	846	938	1039	1151	1274	1409
TAX		0	0	0	0	0	0	0	0	0	0	98	117	139	162	187	215	245	296	328	364	403	446	493
NP		-100	-73	-46	-15	18	54	92	134	178	227	181	218	258	301	348	399	454	550	610	675	748	828	916
EQ		-47	-20	7	38	71	107	145	187	231	279	234	271	310	354	400	451	507	603	662	728	801	881	968
YR		0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DF		1	1	1	1	1	2	2	2	3	4	4	5	6	7	9	11	13	15	18	22	27	32	38
PVFCF	-155	-47	-20	7	31	49	62	70	75	77	78	54	52	50	48	45	42	39	39	36	33	30	28	25
ENPV	828																							
EIRR	16.68																							
FCFF		171	188	205	227	250	276	305	337	372	410	453	500	551	608	671	739	815	899	991	1092	1204	1326	1462
YR		0	0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
DF		1	1	1	1.1	1.21	1.33	1.46	1.6	1.76	1.93	2.12	2.33	2.57	2.82	3.1	3.4	3.74	4.11	4.52	4.96	5.45	5.99	6.58
PVFCFF	-1260	171	188	205	206	207	208	209	210	211	212	213	214	215	216	216	217	218	219	219	220	221	221	222
PNPV	3710																							
PIRR	15.62																							

Table 4.14 Financial results of Operational PPP projects

Sr. No	Sector	Total No. of PPP projects	Total No. of PPP Projects with Positive Project IRR	Percentage of No. of projects with positive Project IRR	Total Number of Projects with Positive equity IRR	Percentage of number of projects with positive Equity IRR
1	NHAI Toll Roads	65	41	63	16	25
2	NHAI Annuity Roads	26	26	100	12	46
3	State Roads	50	40	80	18	36
4	Airports	5	5	100	5	100
5	Seaports	18	14	77	12	66
6	Metro Projects	3	2	66	0	0
7	Renewal Energy Projects	4	4	100	3	75

Projects	**170**
Projects with positive Project IRR (PIRR)	**132**
Projects with positive Project IRR (PIRR)%	**77%**

Projects	**170**
Projects with positive Equity IRR %	**64**
Projects with positive Project IRR (PIRR)%	**38%**

Table 4.15 Range of Equity IRR of Operational Projects

Sr.No.	sector	Negative 20 TO Negative 10	Negative 9 TO Negative 1	0 TO 10	11 to 20	More than 20
1	NHAI TOLL ROADS	20	27	11	7	1
2	NHAI ANNUITY ROADS	5	9	7	4	1
3	STATE ROADS	16	16	9	3	6
4	AIRPORTS	0	0	2	3	0
5	SEAPORTS	5	1	6	3	3
6	METRO PROJECTS	0	3	0	0	0
7	RENEWAL ENERGY PROJECTS	0	0	2	1	1

Table 4.16 Results of Operational projects in terms of Cost vs. Returns

Sr.No.	sector	POSITIVE Project IRR-WACC	NEGATIVE Project IRR-WACC	POSITIVE E IRR-Cost of Equity	NEGATIVE EIRR-Equity Cost
1	NHAI TOLL ROADS	10	55	5	60
2	NHAI ANNUITY ROADS	9	17	5	21
3	STATE ROADS	12	38	10	40
4	AIRPORTS	5	0	2	3
5	SEAPORTS	7	11	5	13
6	METRO PROJECTS	0	3	0	3
7	RENEWAL ENERGY PROJECTS	2	2	1	3

Table 4.17 Financial Returns of Premium -Based Operational Toll roads

Financial Returns of Premium -Based Operational Toll roads				
Sn	**Company**	**Year**	**EIRR**	**PIRR**
1	Ashoka Sambalpur Bargarh Tollway Private Limited	2010	-15	-9
2	GMR Ambala Chandigarh Expressways	2005	-10	-3
3	GMR Hyderabad Vijayawada Expressways	2009	-5	1
4	IRB Tumkur Chitradurga Tollway Private Limited-	2010	15	7
5	Rohtak Panipat Tollway Private Limited(Sadbhav)	2010	-12	-3
6	Ashoka Belgaum Dharwad Tollway Limited	2010	-2	0
7	BSCPL Godhra Tollways Limited	2010	-4	1
8	DS Toll Road Limited(Reliance Infra)	2006	19	15
9	Guruvayoor Infrastructure Private Limited (SREI Infra)	2006	-1	5
10	GVK Deoli-Kota Expressway Private Limited	2010	-11	0
11	L&T Krishnagiri Thopur Road	2009	10	10
12	Hyderabad Yadgiri Tollway Private Limited (Sadbhav)	2010	2	5
13	Soma-Isolux-Kishangarh-Ajmer-Beawar Tollway	2009	-10	-4
14	L&T Panipat Elevated Corridor Private Limited	2005	-13	-2
15	Baleshwar Kharagpur Expressway Limited (ITNL)	2012	-10	-8
16	Kurukshetra Expressway Private Limited(BRNL)	2010	-2	2
17	Oriental Pathways Indore Pvt. Ltd-	2006	-1	5
18	Khed Sinnar Expressway Limited (ITNL)	2013	-16	-8
19	L&T BPP Tollway Limited-Beawar Pali Pindwara	2015	na	Na
20	L&T Samakhiali Gandhidham Tollway	2017	na	Na
21	IRB Ahmedabad Vadodara Super Expressway Tollway	2011	na	Na

4.2.2 Regression Analysis

To test the relationship between the Equity IRR of the project and eight independent variables as described below, Ordinary Least Square regression analysis is done according to the following implicit model:

$y = \beta 0 + \beta 1x1 + \beta 2x2 + \beta 3x3 + \beta 4x4 + \beta 5x5 + \beta 6x6 + \beta 7x7 + \beta 8x8 + \varepsilon$

Where y = Equity IRR is the Dependent variable.

Table 4.18 Independent Variables

Independent Variables	
X1 = Project IRR	X2 = Debt/Equity Ratio
X3 = Increase in cost in %	X4 = Completion delay in months
X5 = Concession Duration in years	X6 = Debt in INR Crs
X7 = Actual cost in INR Crs	X8 = Equity in INR Crs

The descriptive statistics for the sample of 170 operational projects are shown in table 6.5. The results of the reliability test are shown in table 6.6 and the result of the ANOVA test and the model summary are shown in Table 6.7.and Table 6.8 exhibits coefficient correlations.

Table 4.19 Descriptive Statistics

Descriptive Statistics

	Mean	Std. Deviation	N
EQUITY IRR	-1.368	13.5734	170
PROJECT IRR	4.17	8.209	170
D/E ratio	3.738566	2.7304313	170
INCREASE IN COST %	48.289412	62.8739101	170
Completion delay	9.68	13.415	170
CONCESSION DURATION	22.309	8.8957	170
Debt	849.2809	1767.27716	170
ACTUAL COST	1125.9093	2227.44344	170
Equity	272.2572	563.30923	170

Table 4.20 Reliability Test

Case Processing Summary				Reliability Statistics	
		N	%	Cronbach's Alpha	N of Items
Cases	Valid	170	100	0.641	9
	Excluded	0	0		
	Total	170	100		

Table 4.21 ANOVA Test

ANOVAb						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18210.04	8	2276.254	28.351	.000a
	Residual	12926.24	161	80.287		
	Total	31136.27	169			

a. Predictors: (Constant), Equity, D/E ratio, Completion delay, PROJECT IRR, INCREASE IN COST %, Debt, CONCESSION DURATION, ACTUAL COST

b. Dependent Variable: EQUITY IRR

Model Summary

Model Summary(b)										
							Change Statistics			
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
	.765a	0.585	0.564	8.9603	0.585	28.351	8	161	0	2.249

Model : a. Predictors: (Constant), Equity, D/E ratio, Completion delay, PROJECT IRR, INCREASE IN COST %, Debt, CONCESSION DURATION, ACTUAL COST ; b. Dependent Variable: EQUITY IRR

Table 4.22 Coefficient Correlations

Coefficient Correlations(a)										
Model			Equity	D/E ratio	Completion delay	PROJECT I	INCRESE II	Debt	CONCESSION DURATION	ACTUAL COST
1	Correlations	Equity	1	0.193	-0.047	0.083	-0.302	0.768	-0.322	-0.822
		D/E ratio	0.193	1	-0.004	-0.129	-0.12	-0.061	-0.151	0.008
		Completion delay	-0.047	-0.004	1	0.136	0.098	0.016	-0.117	-0.005
		PROJECT IRR	0.083	-0.129	0.136	1	-0.017	0.056	0.004	-0.06
		INCRESE IN COST %	-0.302	-0.12	0.098	-0.017	1	-0.098	-0.018	0.116
		Debt	0.768	-0.061	0.016	0.056	-0.098	1	0.003	-0.99
		CONCESSION DURATION	-0.322	-0.151	-0.117	0.004	-0.018	0.003	1	0.005
		ACTUAL COST	-0.822	0.008	-0.005	-0.06	0.116	-0.99	0.005	1
	Covariances	Equity	1.65E-05	0	-1.01E-05	2.94E-05	-1.58E-05	1.22E-05	0	-1.22E-05
		D/E ratio	0	0.079	-6.55E-05	-0.003	0	-6.72E-05	-0.005	8.65E-06
		Completion delay	-1.01E-05	-6.55E-05	0.003	0.001	6.72E-05	3.43E-06	-0.001	-9.43E-07
		PROJECT IRR	2.94E-05	-0.003	0.001	0.008	-1.85E-05	1.91E-05	3.40E-05	-1.91E-05
		INCRESE IN COST %	-1.58E-05	0	6.72E-05	-1.85E-05	0	-4.92E-06	-2.58E-05	5.48E-06
		Debt	1.22E-05	-6.72E-05	3.43E-06	1.91E-05	-4.92E-06	1.53E-05	1.33E-06	-1.42E-05
		CONCESSION DURATION	0	-0.005	-0.001	3.40E-05	-2.58E-05	1.33E-06	0.012	2.18E-06
		ACTUAL COST	-1.22E-05	8.65E-06	-9.43E-07	-1.91E-05	5.48E-06	-1.42E-05	2.18E-06	1.34E-05
Model : a. Dependent Variable: EQUITY IRR										

Coefficients(a)													
		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B			Correlations		Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-13.464	2.407		-5.593	0.00	-18.218	-8.71					
	Project IRR* **	1.223	0.087	0.739	14.1	0.00	1.051	1.394	0.744	0.743	0.716	0.938	1.07
	**D/E Ratio ** **	0.564	0.281	0.113	2.007	0.046	0.009	1.119	0.231	0.156	0.102	0.807	1.24
	Increase in cost %	-0.009	0.013	-0.042	-0.711	0.478	-0.034	0.016	-0.02	-0.056	-0.036	0.73	1.37
	Completion delay	0.013	0.053	0.012	0.234	0.815	-0.093	0.118	-0.088	0.018	0.012	0.923	1.08
	Concession Duration **	0.249	0.111	0.163	2.237	0.027	0.029	0.469	0.055	0.174	0.114	0.483	2.07
	Debt	0.003	0.004	0.334	0.655	0.513	-0.005	0.01	0.022	0.052	0.033	0.01	101
	Actual Cost	-0.003	0.004	-0.447	-0.743	0.459	-0.01	0.005	0.007	-0.058	-0.038	0.007	140
	Equity	0.002	0.004	0.082	0.484	0.629	-0.006	0.01	-0.054	0.038	0.025	0.091	11
a. Dependent Variable: EQUITY IRR													

Note : *p<0.10 (significance at 10% level), **p<0.05(significance at 5% level), ***p<0.01(significance at 1% level)

Equity IRR = -13.46+1.22*Project IRR+0.56*D/ERatio-0.009*Increase in Cost in % -0.013*Completion delay+0.249*Concession Duration+0.003*Debt-0.003*Actual cost+0.002*Equity

The regression results indicate that the actual cost and increase in cost in % negatively impact the Equity IRR of the project. Whereas higher concession duration, higher debt equity ratio, higher equity and higher Project IRR positively affect the Equity returns to Sponsor of the project. The standardized coefficient b of completion delay (0.012<0.05) indicates that there is significant impact of completion delay on Equity IRR of the project.

4.2.3 Cost and Time Overrun of PPP Operational projects

Table 4.25 Cost and Time Overrun of PPP Operational projects

Time and Cost Overrun statistics of operational PPP projects in India				
Sr No	Infrastructure Subsector	No of projects	Average Cost Overrun in %	Average Time Overrun in months
1	National Highways Toll Roads	65	47.22	11
2	National Highways Annuity based Roads	26	23.4	6
3	State Roads	50	37.06	8.74
4	Sea Ports	17	65.89	7.18
5	Air Ports	5	18.6	7
6	Renewable Energy projects	4	54.49	15
7	Metro Rail PPP Projects	3	106.62	27

The time and cost overrun statistics of operational projects is presemted in table 6.4.The vaious factors responsible for such a high time and cost overrun are non availability of Land , Right of way,environment clearances, forest land clearances,government permissions.Other issues are legal disputes,Rehabilitation and resettlement issues ,shifting of utilities,changes in government policy,delay in getting financial closure,weak financial positions of sponsors,inadequate due diligence by concessionbaire during bidding stage,lack of coordination and trust between concessionaire and government authority , among government departments, and between cental and state government.

Interest during construction (IDC) is generally 15% for projects facing no delays. However IDC component as % of project cost can increase to the range of 30-40% of project cost facing substantial time overrun. The quantum of IDC increases depending upon debt disbursed by lenders, interest rate being charged and overall Implementation period. With such high IDC capital cost increases.

There is significant Time overrun/delay during construction resulting into delayed PPP projects. This has resulted into reduced concession period and the cash flow to be received for the duration for which project is delayed and hence loss of revenue leading to negative NPV for most of the projects. The cost - time overrun of the project negatively impact the value for money of the project defeating the very purpose of PPP project vis-à-vis traditional procurement.

4.3 Qualitative Analysis of Operational PPP projects using Case study method

4.3.1 Case studies of financially successful Operationsl PPP projects

C1. IRB Tumkur Chitradurga Tollway Private Limited (A case of Successful PPP project)

Background

Tumkur is the industrial town of Chennai-Bengaluru Industrial Corridor and designated as a sister city of Denmark's Aalborg.Tumkur University imparts top-level education. Tumkur is selected by the government of India to develop as a smart Industrial city. Chitradurga is a historical city ruled by many dynasties in the past and gained its name from the umbrella type hills situated in the city. It is marked as one of the most backward districts in India. The distance between the Tumkur and Chitradurga is 135 km via NH 48.

The project was undertaken as a part of NH4 up-gradation under the Golden Quadrilateral project in India implemented by the National Highway Authority of India (NHAI). The road project involved extension of a four-lane road to a six-lane road. NHAI awarded and implemented the project on the BOT (Toll) model. The Toll model involves collection of toll from the users of the road facility during concession period, which compensates the concessionaire for the capital and operational expenses incurred.

The bidding Process

In a two-stage bidding, in the first stage, the selection was done on the basis of technical expertise of developers while in the second stage the final developer was selected based on the financial proposal. Twelve bidders participated in the RFQ stage, while the six bidders in the RFP stage, of which the IRB Infrastructure developers Ltd. was awarded the bid.

Implementation

The six lane road project was developed by IRB Tumkur Chitradurga Tollway Pvt. Ltd. (ITCTPL), an SPV floated by IRB Infrastructure on BOT (Toll) basis in DBFO mode. The construction of the road was started in June 2011 and ended in February 2014 after a time overrun of 45 days. The actual project cost incurred was INR 12.60 billion as against the estimed cost of INR 8.39 billion with a cost overrun of 50%.

Signing the contract

NHAI and ITCTPL signed the concession agreement in August 2010.ITCTPL constructed a 115 km road connecting Tumkur and Chitradurga on a DBFOT basis. Construction started on June 4, 2011 and completed on July 4, 2014. The concession period is 26 years from 16 th August 2010 and Concession End Date (as per Concession Agreement) 15 th August 2036.

Financial Closure

The financial closure for the six-lane, 114 km stretch between Tumkur and Chitradurga on NH4 with estimated at INR 13 billion. The equity contribution by the company is INR 1.5 billion and the debt is INR 11 billion. The consortium of bankers led by IDFC Bank, Bank of Baroda, HDFC bank, and IDBI Bank has financed the project. IDFC has financed INR 5 billion and the balance has come from the rest.

The Technical details

The project highway envisages "Up-gradation, Operation and Maintenance of Tumkur – Chitradurga Section (NH4)" with paved shoulders, service roads on both the sides, construction of flyovers, and widening of bridges and culverts. The package was a part of NH-4, and the entire length of the project road was passing through Tumkur and Chitrdurga districts of Karnataka. The project road passes through Sira, Adivala, Hiriyur and Aymangala, which are urban/semi-urban centers along the Project Highway.

The concession/Contract

The key points of the contract/concession signed between NHAI and Project SPV ITCTPL is given below:

Table 4.26: The Contract Details

The Contract Details		
Sl. No.	**Account**	**Description**
1	Authority	NHAI
2	Contract Package No	NHDP-V/MC-II/BOT/TC
3	Name of Contract Package	Six lane road connecting Tumkur Chitradurga
4	Location	75 to 190 km on NH5
5	Length Km	114Km
6	Name of the Concessionaire	IRB Tumkur Chitradurga Tollway Pvt. Ltd.
7	Name of EPC Contractor	M/s Modern Road Makers Pvt. Ltd., Mumbai
8	Name of Independent Engineer	Intercontinental Consultants and Technocrats Pvt.Ltd.
9	Agreement Date	16thAugust 2010
10	Appointed Date/Handing Over of Site	04th June 2011
11	Concession Period	26 Years commencing from Appointed Date (including construction period of 912 days)
12	Construction Completion Period	912 days from Appointed Date.
13	Construction Completion date	02ndDecember 2013
14	Total Project Cost	839 Cores

Source: NHAI

The significant contract terms

1. The authority NHAI can get bids for capacity augmentation of the road.

2. At the end of the contract, the developer will handover the road to NHAI after inspection by NHAI engineer.

3. NHAI shall make available land for the project.

4. The design had to be accepted by NHAI and vetted by an independent engineer. In addition the road designs were standardized as per the Indian Roads Congress and Ministry of Surface Transport standards.

5. The road design is to be approved by NHAI.

6. An early completion shall a bonus and delay shall attract penalty.

7. In cases of default in the maintenance of the road, NHAI may impose penalty or terminate the contract.

8. NHAI shall pay 80% of dent as terminated payment

9. The Concessionaire shall bear the cost overrun of the project.

10. The escalation in toll rates will be linked to whole sale price index (WPI).

Responsibility of the NHAI

1. Selecting a private partner through competitive bidding
2. Forming the Concession Agreement
3. Finalizing the project implementation plan
4. Monitoring the timelines and deliverables
5. Providing the required land for the project
6. Providing the environment permissions for the project
7. Resolving Disputes
8. Monitoring periodic maintenance of the road during operational phase
9. Ensure third party independent audit by Engineer

Responsibility of the private partner -IRB

1. Financial closure
2. Ensuring availability of project resources
3. Appointing a subcontractor
4. Planning project activities, timelines, and dependencies during construction
5. Carrying out periodic maintenance during operations phase.
6. Setting up Toll plazas
7. Submitting all MIS reports periodically
8. Reporting progress and discuss/correct any issues with NHAI

Inclusion in IRB INVIT fund

IRB Infrastructure has launched India's first ever Infrastructure Investment Trust (InvIT) Initial Public Offer (IPO). Tumkur-Chitradurga project is included in the portfolio of IRB InviT.

The project Outcome

National Highway -four is a six-lane national highway connecting Mumbai and Chennai. Between Mumbai in Maharashtra and Chennai in Tamilanadu it connects industrial towns and state capital cities.

The Golden Quadrilateral project was launched by the Government of India to raise the quality of Indian roads. NHAI implemented the project largely on PPP basis by using the efficiencies and technical expertise of the private developers without government investment. The time and cost overrun, project financing, and revenue risks were transferred to the private developers creating the value for money for the government and efficient road services to the citizens.

The project, till date, has run successfully. The road has enhanced the social infrastructure of the areas. This four lane express way assisted in the progress of commercial and retail establishments. The widening of this national highway has a positive impact on the connectivity between the two cities Tumkur and Chitradurga. The travel time between the two cities which was earlier five to six hours, has now reduced to less than three hours. The movement of goods has become easier; as a result, a lot of warehousing has come up and the tourism in historical city of Chitrdurga has also improved.

The Risk and Contract Management Analysis of IRB Tumkur Chitradurga Tollway

Table 4.27 Contract and Risk Management matrix of IRB Tumkur Chitradurga Tollway

Contract and Risk Management matrix of IRB Tumkur Chitradurga Tollway			
Project Risk	**Sponsors Risk**	**Government Risk**	Output
Sponsors/lenders Risk			
Construction	Project contracts, Turnkey EPC contract ,Development Expertise, Resource Development	Availing 21 acres of land in Mumbai	The construction completed on time
Technical performance	Project ownership/contracts, Turnkey EPC contract	None	The independent consultant approved the technical specifications of the project.
Financing	Financial Closure	None	Final closure is successfully done
Financing	Interest rate hedge	NHAI ability to pass-through finance costs	The toll linked to WPI
The government Risk			

Forex	Hedge forex rate	Fiscal policy	Hedged
Macroeconomic	Indexed contract	Passing prices to end customer	Inflation increased project cost marginally
Facility performance	Quality treatment	Controling payment	The project running successfully
Political Risk	Insurance	Local policy	No political risk observed
Shared risks			
Forest, Environmental ,Utility licenses, land acquisition	Both the government and private partner work together to get the licenses and land on time	Both the government and private partner work together to get the licenses and land on time	The project constructed on time
Contractual Risk	Operation of the project as per contractual terms	Efficient Monitoring by NHAI	No contractual dispute observed between the partners
Operational Risk	Major maintenance of the road	Efficient Monitoring by NHAI	The project is running successfully

Conclusion

The project has given decent financial return of 15% to the private developer and Value of money to the government (NHAI) despite observing 50% cost overrun due to strong revenue in the form of toll collection. The project has boosted the social infrastructure and give impetus to local tourism. A successful partnership was built to optimally share the project's roles and responsibilities and risks with the private partner creating WIN WIN situation for all the stakeholder's involved in the project.

Documents referred to:

1) Annual Report of IRB Infrastructure, the project sponsor

2) Annual Report of the SPV - IRB Tumkur Chitradurga Tollway Pvt. Ltd. (ITCTPL)

3) Credit Rating Report by ICRA

4) Corporate Data bases Prowess and Capital line

5) www.ppinindia.gov.in (GOI's PPP database)

6) NHAI and MORTH websites

7) Articles in journals

8) Filing by IRB Infrastructure Ltd. on BSE & NSE

Table 4.28: Current Toll fee structure

Current Toll fee structure			
Vehicle	**One Side Journey**	**Return Journey**	**Monthly Pass**
Car/Jeep/Van	85	130	2915
LCV	140	210	4700
Bus/Truck	295	445	9850
Up to 3 Axle Vehicle	465	695	15450
4 to 6 Axle	465	695	15450
HCM/EME	465	695	15450
7 or more Axle	565	850	18810
Design Capacity and Actual traffic observed on the stretch			
Design Capacity (PCU)	120000		
Traffic (PCU/day)	46600		

C2. A Lifesaving initiative for patients with kidney failure: A well-structured and efficiently implemented, pioneering, public- private health partnership in India (A case of successful PPP Project)

Abstract

The dialysis machine acts as an artificial kidney, a life saver for patients who's both kidneys are failed. But the dialysis process is physically painful and economically stressful especially for the poor patients. Even for the government, providing the dialysis services to the poor patients is exorbitant. This is a case of setting of the dialysis centres by Andhra Pradesh Government in partnership with the private service provider on public-private partnership basis. The government was able to discharge its duty of providing good quality dialysis facilities to its citizens at affordable cost while the private partner achieved a fair IRR of around 25% on its investment in this project. So it is economically WIN-WIN situation for both the partners and emerged as a successful and imitable example of public-private partnership for the rest of the country and other developing countries. The efficient contract formation, implementation and enforcement, vigilant monitoring, sound payment mechanism and strong partnership are the driving factors for the success of this pioneering healthcare PPP project in India.

Key words: Dialysis; Healthcare; PPP; financial model; IRR, Contract Management

Introduction

Sixty-nine year old Kanka Rao from Srikakulam in Andhra Pradesh was suffering from End Stage Kedny failure. His both kidneys were unable to filter the metabolic toxins and surplus water from the blood for secretion through the urine. As both the kidneys failed to filter the blood, an excessive amount of protein was excreted through the urine, as a result his body was

lacking this protein. In addition, edemas (retained water) was formed in his legs and lungs damaging those organs.

The inadequate removal of toxins started to upset the heart beats leading to the infection in the heart sac. The nephrologist suggested the remedy of kidney transplant. Mr. Rao tried for this option for three years but could not get any kidney donor. The only option left was to go on regular, life-saving, dialysis treatment at a dialysis centre to prevent the damage of further organs. Of course the dialysis exercise was painful, with each session requiring four hours for the dialysis apart from the waiting and travelling time.Apart from this physical pain, Kanka Rao's life-savings were diminishing fast to get dialysis sessions that was costing INR 35,000 per month including travel expenses to dialysis centre 100km away from his home.

The worldwide prevalence of chronic kidney disease (CKD) was 15% and was rising steadily, out of which only less than 1% of CKD patients progressed to end-stage kidney failure.The prevalence of CKD, the antecedent to ESRD was 1% in India as per AIIMS study.

The first dialysis centre in India was setup at CMC hospital, Vellore in 1960 followed by KEM hospital in Mumbai, AIIMS New Delhi, and PGI hospital in Chandigarh in the same decade. In last five decades, the dialysis centres were established in multiple formats such as Nephrologist owned Dialysis centres, In Hospital Dialysis centres, Dialysis centres run by the Charitable Organizations, and Stand-alone Dialysis centres.

The key challenges in setting up Dialysis centres were high fixed asset cost, dearth of clinical and para clinical skilled workforce, limited seven years life of dialysis machines, the regular maintenance of machines due to higher running time, high cost of employee's salary , electricity , and consumables. Despite all these challenges, by 2006, few stand-alone dialysis centres were set up by leading multinational Medicare organizations such as Fresenius Medical Care Pvt. Ltd., B. Braun Medical India Pvt. Ltd., and Nipro India Corporation Pvt. Ltd.

Way back in 2008-09, 7% of 65 million population in the state of Andhra Pradesh in India was diabetic and the cost of dialysis was INR 1800-2000 per session (minimum two dialysis sessions required per week). Out of one million population, average 150 were suffering from CKD, and known kidney patients were more than 10,000 in the state. Considering the two dialysis per week and 108 per annum total 10, 44,900 dialysis session per annum were required, for which 1200 dialysis machines were needed. The total number of both the government and the private dialysis machines were only 475 catering only 4000 patients with remaining 6000 patients were left-out. The kidney failure in Srikakulam district was very high up to 20% of the total population. The government was studying causes for this with Harvard medical school and Bhabha Atomic Research Centre under project SEEK (Screen early evaluate kidney diseases). The patients from remote villages and towns were traveling 50-200 kilometers every other day to access a dialysis facility. In Andhra Pradesh, only 25% of patients who needed dialysis received it, leaving only option of death for the left-outs.The Government of Andhra Pradesh was facilitating the basic medical treatment to the patients living below the poverty line (BPL) through the Rajiv Arogyasri health insurance scheme.

Case Description

The Andhra Pradesh state run district hospitals had limited capacity to perform dialysis of below poverty line patients. The government appointed a committee to suggest remedy for this issue. The committee comprised of nephrologists, legal experts, financial experts, and senior

government bureaucrats. The committee suggested PPP mode which was evolving in Indian infrastructure sector mainly in transport and power sector. This project was going to be the first-ever PPP project in healthcare sector in India.

Procurement Process

The Procurement Committee was established to ensure consistent and correct application of procurement practices. The health secretary of the state was appointed as head of the procurement committee comprising of legal, finance, medical, and technical experts. In a span of four months, the committee drafted the overall bidding process and prepared the PPP contracts terms. The significant terms of the concession are presented in exhibit 1.

Selection Process

The procurement committee spearheaded the selection process (exhibit 2).The selection criterion was as described below:

1. The service provider must be registered with an appropriate statutory authority

2. The service provider shall have minimum five year experience in providing health care activities

3. The service provider shall have minimum experience of three years of running a dialysis centre

4. The annual turnover of the bidder shall be INR Sixty million in of last two financial years

5. No litigation shall be pending against the bidder.

After rigorous competitive bidding process, involving technical and financial round, and subsequent round of discussions, **Kedney Care (India) Pvt. Ltd***., a subsidiary of Kedney Care AG, Germany, was awarded the contract.

Project Implementation

The project started in 2010. The Government of Andhra Pradesh nade available required medical treatment to patients below poverty line free covered under the Rajiv Arogyasri insurance Scheme. The Government paid the Kidney Care an agreed price for each performed dialysis. Total 11 hemodialysis centre hosting 110 hemodialysis machines were established and run by Kedney Care in 11 medical colleges and hospitals in Kakinada, Kurnul, Vishakhapatnam, Srikakulam, Anantpur, Vijayawada districts and NIMS Hyderabad. The Kedney Care set up the centres with an investment of INR 45 core (about 6 million USD). The Government of Andhra Pradesh paid INR1200 (USD16) per each dialysis out of which INR 1080 (about USD 14) was paid to Kidney Care and INR.120 (USD1.6) was paid to the respective hospital/medical college.

The district hospitals provided space, electricity, water, nephrologist, and supporting staff hired from within the hospitals, making the project cost-efficient.

* Note: The company name is disguised

Discussion

It is observed that the ten machines per Dialysis centre at contracted rates of INR 1080 per dialysis session.The cost of the dialysis service INR 1080 was the amount reimbursed by the government to the contractor.This amount wasr collected from the patients and deposited in a bank and then the government reimbursed the contractor.

The financial analysis demonstrate the commercial viability for the private partner at the contracted price of the dialysis service. The finance for this project was arranged under Rajiv Arogyashri Insurance Scheme, the financial grant available from various governmental development projects as well as the departmental fund for procurement, and the dialysis cost recovered from the above poverty line patients.

Economic Impact

The government was able to discharge its duty of providing good quality dialysis facilities to its citizens at affordable cost thus achieving value for money for its investment while the private partner Kedney Care has gain access to more patients, sold its manufacturing machine and achieved a decent IRR of 25% (Exhibit 3) on its investment in this project. So it is economically WIN-WIN situation for both the partners and emerged as successful and imitable example of public-private partnership for the rest of the country and other developing countries. A strong payment mechanism linked to the Rajiv Arogyashri insurance scheme and the price of INR 1080 was correctly chosen. The contract formation, its implementation and enforcement was very efficient and a strong partnership was observed from both the parties.

The Project Outcome

Rukmini, a 53-year-old kidney patient from Kakinada said, "The Kidney Care centre has given me a new confidence for undergoing dialysis sessions. Rukmini remembered how the kidney disease had crippled her financial condition. She says: "More than the disease or even threat to my life, I was petrified of the expenses and financial burden on my family because of me. My husband, who hardly earns INR 10,000 per month, was very worried. Looking at the expenses at the private hospitals, I wished to skip some dialysis sessions to save money. But with the affordable dialysis treatment at the Kedney Care centre, I have regained some mental strength." Earlier, Rukmini had to spend nearly INR. 30,000 on the recommended twelve dialysis sessions each month and this cost has now been halved. Rama Reddy, her husband, says, "I am a landless person without any regular income. The Kedney Care centre has come as a big help to my family."

Krishna from Kurnool district was undergoing dialysis treatment since 2007. He was unemployed and dependent on his mother for the weekly expenses for dialysis treatment. He started availing the dialysis services at the Kedney Care centre since May 2010, said that there was a difference in the quality of services provided by the Kidney Care centre and other private facilities. "This centre is not only clean and hygiene but also follows the international standards for the management of dialysis machines which results in better service to the patients," he says.

Dr. H Y Rangaraju, Superintendent, Kakinada district hospital feels that these dialysis centre are reaching out to greater number of people having kidney diseases. "There is no other such facility in Kakinada outside the hospital premises that provides quality services at half the

market rates," he says. Talking about the free dialysis facility available through the Government at the Kakinada, Dr. Rangaraju avers that it was overburdened with the patients and that can imply long waiting time. "The Kedney Care run dialysis centres have helped in taking off the load from the government facility by offering low-cost services to the patients and with the use of latest equipment," he says. Dr.Rangaraju also adds that the PPP model for dialysis patients is a welcome step as it also deals with the challenge of shortage of trained manpower in the public health sector by availing the skilled labour to provide these services.

Dr. Rajiv Ayyar, a medical officer in Kakinada government hospital, is of the opinion that the demand for costly medical services can be met with such innovative models. He comment, "The objective is to serve the poorer section of the society without squeezing their wallets which can successfully done through such a PPP model. But supporting the Kedney Care run dialysis centre s, Dr. Rajiv also suggested to run these centres in a transparent and equitable way. "The services should be available to people without any discrimination," he says.

Mr. Kanka Rao stated, "The state-of-the-art dialysis facility at the Srikakulam Hospital has not only saved me and many other patients from the high expenses of travelling to far-off cities but also the painful experience of travelling in difficult physical condition."

This unique healthcare delivery model has gained wholehearted acceptance by the stakeholders and created WIN – WIN situation for all the stake holders of this project including the end customer of the healthcare product.

Status of dialysis centre in 2021

After completion of this project, encouraged by the positive outcome of the PPP model, the renewed contract was awarded through competitive bidding in 2017 to nephroplus, a service provider with 140 Dialysis centres spread over 80 cities across 17 States in the country. Under the new PPP contract, per dialysis charge was decided as INR 965 per treatment, the lowest-ever by any service provider in the world. The dialysis centres increased to 27 from 11 out of which 12 in Srikakulam with high incidence of kidney failure in Uddanam Palasa, Kavigiri, and Sompeta areas region of Srikakulam. The earlier Rajiv Arogyasri scheme now reframed as NTR ArogyaSri, and its card-holders are eligible for free treatment. Andhra Pradesh was the

first State in the country to offer a pension of INR 2500 to patients suffering from kidney ailments. The government has a target to render the treatment to 10,000 patients. In Andhra Pradesh before this project 25% of patients were receiving dialysis. With this initiative, it has gone up to 50-60%.

Conclusion

The efficient contract formation, implementation and enforcement, vigilant monitoring, sound payment mechanism, and strong partnership are the driving factors for the success of this pioneering healthcare PPP project in India. The project set example of successful and imitable public-private partnership for the rest of the country and other developing countries.

4.3.2 Case studies financially failed operational PPP projects

C1. Coastal Gujarat Power Limited PPP Ultra Mega Power Project (UMPP) – Case of failed PPP project in the power sector (A case of failed completed PPP project)

Background

The electricity reform is believed to bring higher efficiency, lower and stable prices, reliable services, and timely investment, but the outcomes of the deregulation in electricity markets are mixed. The primary objective of electricity reform was to promote long-run efficiency gains through competition that stimulates technical innovation and efficient investment.

The competition among the power producers leads to social gain. The competition helps in making efficient risk and resource allocation decisions and in disciplining industry pricing behavior but the productive efficiency gains in generation are decided by the ability of new entrants to produce at a lower cost than the existing generators. However, enabling competition requires appropriate legislation and creation of necessary institutional framework and procedures. The legal framework for the development of power sector in India is framed by the Electricity Act 2003. As per the act, the union government has prepared the National Electricity Policy for the development of the power sector using coal, natural gas, nuclear materials, and renewable energy efficiently.

The central government framed the national electricity and tariff policy to ensure electricity at optimum rates. To union government declared mega power policy of erecting power plants of 4000MW as "Ultra Mega Power Projects" based on Build, own, operate (BOO) model of public private partnership (PPP).The responsibility of the government was providing land, coal mines, water and various permissions while the private partner had to arrange the technology, and finance to build and operate the project. The cost estimated to build each UMPP was INR.160 to 200 billion. The Power Finance Corporation appointed as a nodal agency for executing UMPP projects.

Project Inception

The Power Finance Corporation created shell companies and acquired land, allotted coal mines provided required clearances to the private companies selected through the competitive bidding. Total 16 UMPPs were proposed to build, of which Mundra was the first UMPP to be commissioned. The unique feature of UMPP was mitigating the pre-construction risks by signing power purchase agreement, acquiring the land and other permissions in advance before bidding process.

Procurement

Fifteen bidders submitted their bids during competitive bidding process. Two bidders not meeting the qualifying criteria were rejected at RFQ stage leaving eleven qualified bidders. At Request for proposal (RFP) stage, six bidders submitted bids. Tata power Limited emerged as successful bidder with an equivalent levellised tariff of INR.2.25 perWh.The levellised tariff consisted of various escalable and non-scalable charges. The special purpose vehicle, Coastal Gujarat Power Ltd (CGPL) was incorporated in February 2006 to execute the project. PPA was signed for 25 years in 2007 with five states.

Project Implementation

The project became fully operational in March 2013. The project signed PPAs with the state distribution companies (discoms) of Gujarat, Rajasthan, Maharashtra, Punjab and Haryana. The coal required for the thermal power plant was imported under long-term arrangements from Indonesia. The project was developed under the Public Private Partnership (PPP) model. These state discoms signed a PPA with the SPV to sell power at INR 2.25 per unit.

The Ministry of Power facilitated the coal block for the plant, the environment and forest permissions, and water in association with the State Governments. The project SPV, CGPL was transferred to Tata Power in April 2007. The project comprised of five units of 800 MW each, out of which three units had been commissioned in 2012 and two in 2013.Tata Mundra UMPP was the first UMPP project commissioned in India.

Management and implementation Challenges

Mundra UMPP installed India‘s first 800 MW unit based on supercritical boiler technology. The required machines were imported from Korea and Japan.The project progressed as per the schedule .The first 800 MW Unit was commissioned in March 2012. The second 800 MW Unit was commissioned in July 2012 and the third unit installed in October 2012.The Company had signed the contract for complete boiler island scope on Engineering - Procurement - Construction basis with Korean company Doosan Heavy Industries & Construction Company and contract for supplying Steam Turbine Generators from Japanese company Toshiba. The insurance contract was signed with Oriental Insurance Company.

Tariff Determination Process

The thermal power tariff was consisted of fixed and variable cost. The fixed costs comprised of interest on debt, return on equity, depreciation, operation and maintenance cost, insurance, taxes, ,and working capital interest. The Variable cost covered the fuel cost for coal and oil. The power generator could recover fixed costs despite non utlisation of entire capacity due to such dual cost structure.

The Electricity Act allows tariffs to be determined by the state or central regulatory commission. In case of fuel supply shortage, the regulator determine the upper and lower limits of the tariff in terms of the contract signed between a power producer and the purchaser maximum for one year to protect the end consumer from price escalations.

The power tariffs is decided through the competitive bidding. The regulator monitors the procurement process and the government facilitate the standard bidding documents of RFQ, RFP and PPA. The bidding rules allows the bidders an alternative to pass through the fuel price via quoting various escalable and non-escalable costs.

The escalable charges allows the bidders to transparently pass on price variations and decide the competitiveness of the bidding process. The bids are checked based on the “levelised tariff” and a power purchase contract is signed with the lowest bidder. The levelised tariff is the ratio of the NPV of total capital and operating costs of a plant to the NPV of the net cost of power generated by the project over its life time. The discount rate used for calculating the NPV is decided by the CERC every six months. The state discom displays all the financial bids and the winning bid on its website after signing the PPA. The final signed PPA is submitted to the

regulator. The quoted tariff is not allowed to change after bidding unless under situation like force majeure and change in law.

Any overvaluation of capital or fuel price results in an increase in the base capital cost of the project. When the overvaluation becomes part of the base cost, it is recovered every year and burden electricity consumers in terms of excess tariff. In competitively bid projects, bidders are expected to quote the most reasonable rates. The RFQ was issued in to qualifying bidders, including Tata Power .The tariff was consist of two main charges energy and the capacity charge, divided into escalable and non-escalable components. After bid evaluation, Tata Power was declared as winner who quoted a levelised tariff of INR 2.3 per kWh. A letter of Interest was issued in December 2006 and Tata Power acquired 100% ownership of CGPL in April 2007.

Financing Information

The project achieved financial closure in October 2006.The estimated project cost of the project as per concession agreement was INR.170 billion ($4.2 billion) in 2008...The actual incurred project cost of the project inflated by 25%. The project was funded on a debt-equity ratio of 1.5:1.On a paid-up equity capital of INR 60 billion, it has accumulated losses of INR 65 billion in 2017.The operations of CGPL remained unviable, given the competitively bid PPA tariff structure with exposure to coal price risk . CGPL's profitability was exposed to market price risks for 55% of its coal requirements as 55% of energy charge in bid tariff was on-escalable. Due to the high international coal prices compared to the prices prevalent at the time of the bid and with change in mining regulations in Indonesia since 2010, CGPL's operations were loss-making, post commissioning. Further, the Supreme Court in its order in April 2017 disallowed any tariff relief to CGPL under "Force Majeure" or "Change in Law" clause as per the terms of PPA.

CGPL's operations are also exposed to exchange fluctuation risk given the sharp depreciation of the Indian Rupee from the bid assumption levels, and the fact that the foreign exchange rate variations on loans is not a pass-through in a competitively bid tariff structure. CGPL hedged its forex and interest rate risk through appropriate derivative instruments.

Chronology of events related to coal price Issue

2010: Indonesia changed the coal mining and pricing framework adversely impacting Indian power plants that dependent on coal import from Indonesia.

2013 : CERC directed the parties to set down to a consultative process to find out an acceptable solution in the form of compensatory tariff over and above the tariff decided under the PPA to mitigate the hardship arising out of the need to import coal at benchmark price on account of Indonesian Regulations and ordered to set up a committee to go into the impact of price escalation of Indonesian coal on the project viability to ascertain the cost of import of coal from Indonesia and suggest a package for compensatory tariff which can be allowed to CGPL over and above the tariff in the PPA.

2014: In 2014, the CERC determined the compensatory tariffs based on the Deepak Parikh Committee's suggestions which was challenged before APTEL by the discoms and the NGOs. APTEL rejected the CERC award.

2016: APTEL disapproved CERC's award of compensatory tariff because the PPA was signed after a competitive bidding process of tariff discovery.

2017: The Supreme Court rule that the change in Indonesian pricing regime cannot be construed either as force majeure or "change in law".

2018: The working group report recommended forming high-powered committee (HPC).Government of India granted Gujarat government the liberty to examine issues and take further action; Gujarat government constituted HPC.HPC recommended partial pass-through of high coal prices to consumers. The Supreme Court cleared that it will not interfere in HPC. The HPC report recommended to pass on the impact of the high fuel costs to consumers, lenders and other stakeholders judicially and not only solely to the consumer.

2020: Tata Power was expecting four state governments to make a decision over amending long-term power purchase agreement that may help loss-making Mundra power project raise tariffs and stays viable. Only Gujarat state amendment to its 2007 supply contract. Haryana, Rajasthan, Punjab and Maharashtra states are still evaluating the proposal. When the state governments approve the amendment to the contracts subject to final approval from CERC.

The Coal Price Issue

Internationally, the coal supply contracts are short term, less than 5 years in terms of coal supply and less than one year in case of coal price. India imports coal from Indonesia, Australia, and South Africa of majorly from Indonesia due to geographical nearness. Tata Power contracted coal from Indonesia as per bid provisions at highly discounted price and made long term shipping provisions. But the new regulations made the contract invalid resulting into higher coal price for UMPP.The PPAs were signed before the episode of hike in coal process making the quoted price during bidding unviable and subject to PPA revival.

Mundra UMPP tariff comprised of 55% non-escalable and 45% escalable fuel cost with 3.5% escalation per annum.At such rate of escalation the project was financially non-viable. Hence Tata power requested the Central and the concerned State Governments to review the PPA and filed a petition with the regulator to account for unexpected rise in coal prices.

The Financial Issue in the project

The court order increases the risk of a future earnings of the project. The expected annual negative impact on Tata Power was INR 8 to 10 billion operating at low load factor.CGPL claimed with CERC and APTEL that if a compensatory tariff was not awarded the project would lose INR 18 billion a year, totaling INR 475 billion for25 year contracted period.

CGPL has option to forego their equity investment of INR 40 billion and requesting the lenders to restructure the company's debt or sign new contracts to sell power to state discoms or find a new developer for the project. In 2017 CGPL had discontinued operating 800 MW of the 4,000 MW total capacity of its plant. The ministry suggested that as PPA is a legally binding document between the procurers and the power producer, any issue is to be settled within the provisions of PPA by the contracting parties.

Concluion

The UMPP scheme has a number of policy innovations but struggled with a number of challenges starting from land acquisition, mining permissions, domestic coal shortage and

unanticipated increase in prices of imported coal. Total 16 UMPPs were planned in Indian power sector on PPP basis, only two were actually built and both are stranded assets. The confidence of bankers and promoters gets shaken. Some bidders underestimated development risks, and banked on upsides that didn't come through. The UMPP project plant requires consumer subsidy for next 25 years and writing down of debt to be viable.

While ensuring the optimum power tariffs for the consumers, the factors beyond the control of the private developers must also be considered in such partnerships. The PPP based UMPP was innovative idea to address the power issues in the country through the private public partnership

Since the coal price paradigm had changed due to factors beyond the control of the project developer, it is expected form the Government to intervene in case of issues, to restore the long- the future of India's coal-based thermal power generation sector facing uncertainty after the Supreme Court order. Only two of the 16 proposed UMPPs became operational while no takers for remaining projects. The Gujarat government abandoned the proposed second UMPP in the state and now no intentions for future project.

The government has not clarified how to deal with changes in law in foreign countries with whom the private developers have a tie ups and impact the domestic projects and who will bear the risk of rising cost. The PPP will not work if the risk only transferred to the private partner.The developers should also bid with honesty and the procurement process must be fair and transparent with the sole objective of protecting the rights and interest of the consumers.

C2. Mumbai Metro One Private Limited – India's first metro rail project on PPP basis (A case of financially failed operational PPP project)

Background

Mumbai Metropolitan Region (MMR) with 4440 square kilometer area is one of the largest metropolitan areas in India and among the largest cities in the world, with a population of round 25 million with 2% per population growth per annum.The Municipal Corporation of Greater Mumbai is the largest constituent of the MMR, with a population of about 15 million in an area of about 450 square km contributing to 7% of GDP of the country.

The Mumbai metropolitan area lies along a north−south peninsula. The city has high population density due to geographical limitations.Mumbai's density and geography present enormous challenges to the transport system. Rail is the primary transport mode in the MMR. The suburban rail route is 400 km. The buses are operated by the state-owned municipal corporation run BEST accomodating five million passengers every day in high traffic zones.The public transport system in Mumbai is highly crowded, unsafe, and slow, affecting primarily the poor, women, and children. The suburban railway lines carry more than 9 million passengers every day.

The suburban trains faced severe safety issues with more than 4000 fatalities every year due to overcrowding. Such bottlenecks the overcrowding put limit on the speed of the rail service and its ability to accommodate more passengers. The increased public transport capacity is crucial to address these severe transport problems; improve livability; provide safe and convenient mobility for the poor, women, and children; arrest the decline in public transport mode share;

and enable the city to develop to its potential. Given the geographic and existing infrastructure constraints and extremely high population density, a metro rail system is the only reasonable alternative.

The project Idea

The Mumbai Metropolitan Region Development Authority (MMRDA) performed the feasibility study of an alternative, efficient and environmentally sustainable mass transport system to cater needs of future two to three decades. The study recommended a metro route connecting from Ghatkopar, a station on central suburban railway and Andhra station on western railway. Further Delhi Metro rail Corporation (DMRC) in its study report extended it to Versova. The Maharashtra Government decided to go for this project and deployed MMRDA as the Project Implementation Agency.

The bidding Process

A two-stage international competitive bidding process was adopted. The first stage was to qualify bidders based on their technical experience while the second stage was to select the final developer based on financial proposal. The RFQ stage had fifteen bidders while the RFP stage had seven bidders, of which the Reliance Infrastructure was awarded the bid. A SPV, Mumbai Metro One Pvt. Ltd. (MMOPL) was incorporated in December 2006 for the development, financing, construction and operation of the Phase-I of the metro project. Reliance Infrastructure Ltd (69%), Transdev lle de France (5%) and MMRDA (26%) were the shareholders in the SPV.The Mumbai project was the first privately built and operated metro railway in India

The project Scope

The scope of the project included design, construction, operation and maintenance of 11.89 km MRTS between Versova and Ghatkopar connecting the eastern and western suburbs of Mumbai and the construction of a double line elevated standard gauge (1,435 mm) rail corridor involving 12 stations. The project has been awarded on a Build, Own, Operate, Transfer (BOOT) basis, under a Concession awarded by MMRDA with concession period of 35 years (2007-2042) including 5 years for construction ending in FY 2042. The concessionaire was assigned the right to collect fare from users of the facility during the concession period. The revenue comes from passenger fare and advertisement and rentals which compensates the concessionaire for the capital cost and operational and maintenance expenses of the project along with a risk adjusted returns thereon.

The significant contract terms

1. The Project include the design, construction, operation, maintenance, ownership and transfer of the MRTS. The financing, design, engineering, procurement, construction, completion, commissioning, operation and maintenance shall be done by the concessionaire.

2. The duration of the Concession shall be 35 years commencing from the Appointed Date.

3. MMRDA shall grant an extension of time during construction and extension of the concession Period in case delay in terms of land acquisition and obtaining various permissions.

4. MMRDA shall provide the land free from Encumbrances.

5. The Concessionaire shall operate and maintain the metro rail on its own or through O&M Contractor. Ensuring safe and uninterrupted flow of traffic.

6. The Concessionaire shall undertake Maintenance Program and submit the reports to MMRDA and the independent Engineer.

7. IN case of a Force Majeure Event Concession Period shall be extended by the period for which such Force Majeure Event shall subsist and any further reasonable period of time as determined by the independent Engineer.

8. In case of a Change in Law, if the developer incurs rise in cost, he will be put in the same financial position as it would have occupied had there been no such Change in Law resulting in such cost increase.

9. The Termination Notice shall be issued by any one Party in case of breaching of contract terms. The Termination Payment shall be payable to the Concessionaire by MMRDA under and in accordance with this contract.

The Financial closure

The financial closure was done in February 2008.The estimated project cost as per concession agreement was INR 24 billion. The actual incurred project cost was INR 44 billion. (Cost overrun on 83%).The project was funded on a debt-equity ratio of 8.6:1. The term loan was INR. 44 billion, and the equity was INR. 5.2 billion. Syndicate Bank is the lead bank of the consortium and the other lenders in the consortium are Indian Bank, State Bank of Hyderabad (now merged with State Bank of India), Bank of Maharashtra, IDBI Bank and India Infrastructure Finance Company (UK).

The Construction Phase

The project encountered various management and implementation challenges during the construction. The project completion delayed by 39 months. Numerous challenges were encountered during its construction. There were frequent and substantial changes in project planning and timelines on account of uncontrollable factors such as a highly constrained Right of Way which was handed over to the concessionaire in February 2012.

Constructing Western Express Highway Bridge was challenging due to traffic of 1,20,000 vehicles per day. This bridge is Asia's highest cable-stayed bridge for a Metro rail and the second highest in the world. The construction of the railway over bridge over the Western Railway near Andheri and the car shed depot has delayed the project. Former Prime Minister Manmohan Singh set the foundation for Metro One project in June 2006.

The construction began in 2008, and was expected to be over by 2010 but the project missed several deadlines and finally completed in 2014. The main reason for this delay was the unavailability of land for construction as MMRDA availed the required land by 2012.The encroachments and religious structures in the stretch stalled the construction work at many locations. The project design had to be changed due to non-availability of records of underground utilities and fire safety certificates.

The ongoing project operations

The project commenced operations in June 2014 and is in its seventh year of operations. It has served more than 600 million customers from inception till December 2019 with week days average of around 4.5 lakh commuters per day making it the busiest metro in India and 8th densest metro in the world.

The metro train has achieved almost 100 per cent train availability and time performance since start of the operation. In FY 2019, MMOPL carried 140 million commuters against 120 million in the previous year. The trains are being operated from five A.M. in the morning till the midnight with a highest frequency of 3 minutes during the peak hours. Mumbai Metro one is collecting additional revenue through non-fare measures such as station branding rights, renting retail area in the stations, advertising in the trains.

The social benefits of the project

The suburban trains are overcrowded, carrying 5000 passengers against design capacity of 1750. Mumbai Metro has reduced the load by nearly 10%. Since the entire train is air-conditioned, commuters are saved from noise/dust pollution and travel with better comfort. The metro provides connectivity from eastern (Ghatkopar) to western (Verosva) Mumbai going hand-in-hand with the existing suburban train facility. The traffic congestion on Ghatkopar to Andheri Road have been reduced and significant waiting time saved while reducing traffic on the road by 50,000 vehicles leading to decongestion of road. The present travel time of 45 minutes from Ghatkopar to Andheri come down to only 20 minutes due to Mumbai Metro. Adequate safety and comfort is provided to the senior citizens, ladies, patients by providing closed doors, CCTVs and safe platforms.

The Environmental Benefits

There is reduction in the air pollution and improvement in the air quality as compared to local suburban trains. The trains produce 50% regenerative energy during braking for captive use. The expected emission's reduction is 20000 ton CO2 emissions per annum.On account of reduction in approx. 0.5 lakhs vehicles on road per day, there will be saving of approx. 0.8 lakhs liters of fuel per day i.e. about INR. 1.5 billion Per year.

The issues in the project

The Fare Fixation Committee appointed by the high court had recommended the metro fare in the range of INR 10 to INR 110. The authority challenged the recommendations in the High court of Bombay to retain the fares as decided in the concession in the range of INR 10 to INR 50.

The High court allowed the concessionaire to continue with the ongoing fare structure of INR10 to INR 50 till the result of arbitration.

MMOPL filed claims of 18 billion against MMRDA due to increase in cost due to delay in handing over the land and the change in project design.MMRDA did not accepted the claims filed by MMOPL and hence MMOPL initiated arbitration proceedings as per the provisions in the concession, MMOPL claimed the actual construction cost of Metro to be 40 billion while MMRDA claimed it to be 24 billion.

The ratings agency India Ratings downgraded the sponsor of the project Reliance Infrastructure's to default grade which had reported a net loss of 34 billion in March 2019.The company's auditors BSR & Co LLP and Pathak HD & Associates raised concerns about company's ability to continue as a going concern. The auditors of MMOPL also raised doubt on the material uncertainty related to going concern of MMOPL in their audit report. The credit rating agency BWR ratings had downgraded the rating of MMPOL to default grade due to delay in servicing the debt.

The debt of 25 billion of MMOPL was classified as a non-performing asset in 2018. The consortium of banks bank was assessing a restructuring proposal.Syndicate Bank, the leader of consortium of lenders put out a public notice seeking expressions of interest from law firms and legal advisors in June 2019.MMOPL received in-principle approvals for the debt resolution plan from lead lender and two other consortium members subject to approval from the other consortium members and compliance with certain terms and conditions.

During lockdown due to the COVID-19 pandemic Mumbai Metro running was suspended in 2020. Till the situation recovered in November. In August 2020, MMOPL informed MMRDA about its intention to sell its equity stake in MMOPL.

The current state of Metro rail projects in Maharashtra

In 2014, Reliance Infrastructure terminated the agreement for the INR 120 billion Mumbai Metro Line II project connecting Charkop in north Mumbai with Bandra in the west and Mankhurd in the east, awarded in 2009, citing the non-fulfillment of obligations by Maharashtra government and requesting to return INR 1.6 billion bank guarantee. The Government of Maharashtra and the concessionaire signed the termination agreement at no cost and no claims to either party. Both the parties mutually decided to terminate the contract for the second phase of the Mumbai Metro project.

MMRDA decided to shift from PPP model to EPC for future metro projects in Mumbai due to observed issues in the metro-1 project and to build the project using government equity and foreign funding. Currently it is working on Metro lines 2 & three funded by Japanese lender JICA.

Conclusion

Although the project is now running in full swing with a lot of benefits, from PPP perspective it was a stark disappointment for the private partner as well as the government. The project is giving negative equity returns to the developer and the developer has approached the government to divest its equity.

The delay in land acquisition and the right of way and various statutory approvals and permissions had resulted into high time and cost overrun of the project during construction. The revenue of the project even though increasing every year but not sufficient enough to pay the interest and principal of the high debt taken which resulted into the lenders declaring the project as NPA.

The project sponsor Reliance Infrastructure Ltd. Could not support the SPV due to its own distressed financial condition. The dispute between the project authority and the concessionaire increased the problems further. Based on the disappointing experience of PPP model in this

project, the government of Maharashtra has resorted back to public procurement from PPP to EPC to complete construction of future metro lines in the Mumbai city.

C3. PNG Toll way Private Limited (A case of financially failed operational PPP project)

Background

Pimpalgaon-Nashik-Gonde is a 60 km stretch on NH3 connecting cities of Nashik, Pimpalgaon, Chandwad and Niphad in Nasik district of Maharashtra.NHAI decided to widen the stretch to address traffic issues on the stretch and decided to build the road on awarded on PPP-DBFOT under the NHDP phase III.

Project Description

PNG Tollway Private Limited is a SPV formed by L&T Infrastructure Development Projects Ltd. (60% shareholding), and L&T Limited (13% shareholding) and Ashoka Buildcon Limited (26% shareholding) for the six laning of National Highway 3 from Pimpalgaon to Gonde in Maharashtra.

L&T Infrastructure Development Projects Ltd. (L&T IDPL) is a subsidiary company of Larsen & Toubro Limited and is the holding company of various infrastructure projects being developed under the public private partnership (PPP) model. Ashoka Buildcon execute EPC contracts in segments like road, bridges, commercial buildings, power transmission and distribution.

The project was awarded by the National Highways Authority of India (NHAI) on a Build-Operate-Transfer (BOT) basis, with a concession period of 20 years starting from January 2010. The total project cost was INR 16.91 billion, which was funded by equity of INR 3.38 billion including mezzanine/quasi equity, and INR 13.52 billion of senior debt with a debt-equity ratio of around 4:1. The project was scheduled to achieve Commercial Operation Date (COD) in July 2012; however, owing to delays on account of unavailability of Right of Way, the final COD was achieved in May 2014.

Issues in the project

The project had recorded weak toll traffic volumes since the achievement of partial COD in October 2012 due to local protests and diversion of traffic near Nasik.The protests had continued in the form of political agitations demanding stoppage of tolling for local users. Despite the Maharashtra state government being a party to the tripartite State Support Agreement, there was no support with respect to additional security to toll plazas which would have aided full tolling.

The Bombay High Court ordered the District Administration to maintain the law and order at the Toll Plaza.The said Directions of the court had not been implemented by the District Administration and the project SPV was forced to continue offering the discounted rates. As the toll rates notified in were 40% lower than the applicable rates, the average daily revenue collections were lower than the initial estimation.

Even after the revision in toll in May 2014, the average daily revenue collections had witnessed heavy deficit compared to the company’s initial forecasts. Hence the company had refused to

pay the committed revenue share to NHAI. The concessionaire faced revenue loss of almost INR one billion.

In March 2016 the concessionaire, the consortium of Ashoka Buildcon and L&T Infra served a termination notice to NHAI on the grounds of prevailing Force Majeure conditions in the absence of requisite State support citing “lack of State support” as a reason and the toll and maintenance operations was taken over by NHAI.

In case the default is not cured and Termination notice is served, this is expected to be classified as an Indirect Political Event as per the Concession Agreement and the SPV will be eligible for termination payments to the extent of Debt Due & 110% of Adjusted Equity.In the event this is decided as an Authority Event of Default, the termination payment would be to the extent of Debt Due & 150% of Adjusted Equity. A payment of INR4.2b was made by the NHAI, which has been disputed and the same is under arbitration.

Issues in the project

The leaders of different political parties had stormed the toll plaza in protest against the toll collection. A number of rounds of meetings between the construction company, the National Highway Authority of India (NHAI) and the District administration could not resolved the issue. The company urged the district administration to prevent law and order situation.

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Chapter 5

Overview of the contract and risk Management of PPP projects in various Infrastructure subsectors

Chapter 5

Overview of the contract and risk Management of PPP projects in various Infrastructure subsectors

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5.1 Analysis of Contract and Risk Management of delayed, stalled, and terminated projects

The risk allocation between the partners is at the core of PPP projects in terms of their bankability. A risk allocation is a process of identifying risks of the project and allocating such risks to the partner who can bear and control risks with minimum cost. Theoretically, an efficient risk allocation leads to an appropriate commercial structure for the project. During the execution of the project, the partners deviate from the underlying principles of risk allocation depending upon the negotiating power of the partners significantly impacting the economics of the project. Yescombe, 2014 divided Project Risks into three categories: Overview of the contract and risk Management of PPP projects in various Infrastructure subsectors

1) The commercial risks or the project risks associated with the concerned project such as technical and financial risks.

2) The political or country risk because of the host nation and government actions and political force majeure events such as war or civil unrest.

3) Macroeconomic or financial risks related to the external economic environment effects which are not directly related to the project such as inflation, interest rates and currency exchange rate fluctuations.

A project finance risk analysis is evaluated through a due-diligence process to collect the necessary information about the project and identification and quantification of project risks. The risks are allocated between the partners through a concession agreement. The lender's only source of debt security is the project cash flow which depends upon the various risks and can put it in jeopardy if the risks are not managened efficiently. The decision of lending is based on stringent due diligence, risk identification, and risk allocation through the concession agreement. In the PPP model, the government authority and private project developer are the

two main risk bearers and must decide the workable risk allocation through project contract.The violation of risk allocation terms specified in the contract adversely impacts the project economics.

The developer can manage the project by ensuring the completion of the project within the stipulated budget and on time and also manage exchange risks by hedging and political risks by purchasing political risk insurance which adds to the cost of the project. The government Authority can manage forex and inflation risks through fiscal policy and the allocation of foreign exchange to specific projects. The authority can also provide sovereign guarantees to ensure the performance of off-takers to encourage the lenders. The lenders can seek the help of an independent technical consultant for an indepth assessment of the project risks.

Financially weak sponsors/Sponsor Risk

Various projects were terminated by the authorities such as NHAI, MPRDC as the private sponsors of these projects could not oblige the contractual obligations especially financial obligations due to their weak balance sheets and credit profile as exhibited in table 5.9 and 5.10 failed in supporting the SPV in case of time and cost overrun during project execution.In many cases. the lenders also step in and substitute the project developer. The sponsors such as Abhijit group, Topworth, Transtroy, Vishwaraj Infrastructure, MBL Infrastructure, and Concast Infratech were debt –laden and financially weak. Many SPVs of these sponsors failed in achieving financial closure even after winning the project order and hence the projects were delayed, stalled and even terminated by the authorities such as NHAI. Many projects were delayed due to delayed land acquisition and environmental permissions and their project cost spiked inadvertently. The sponsors failed in injecting required funds in the form of equity and eventually the projects were terminated and lenders substitute their sponsors.

Table 5.1: Terminated projects due to financially weak sponsors

Terminated projects due to financially weak sponsors			
SR NO	**Project Description**	**Status of the project**	**Financial Status of Promoter**
1	Four lane Barhi Hazaribagh Section 40.5 km in the state of Jharkhand	NHAI terminated the Contract in January 2015 and rebid the project. The lenders filed legal case for recover from the concessionaire in 2016.	The Abhijit group has 12000 Cr debt payable to banks most of which are NPAs.The group was under CDR arrangment.Current credit of group is IND D (Source :India Ratings)
2	Piprakothi-Raxaul section(NHAI,Tantia Pvt. Ltd, TPC 531cr)	Project affected due to late land transfer from NHAI, crunch in working capital, ban on mining by the court. The project lenders have started process to substitute the project developer	The credit rating of company as on March 2018 was ‘SMERA D’.The financial risk profile of TCL is weak with declining revenue and increasing losses year on year basis which resulted in erosion of net worth on constant basis (source: SMERA ratings)

3	Satna-Bela (NH-75) from km 155.40 to km 198.600 in the state of Madhya Pradesh	Only 30% construction was completed in stipulated time hence the authority terminated the project.	Lenders led by the SBI and PNB filed case in the Mumbai debt recovery tribunal (DRT) against Top worth in 2017.Estimated credit exposure of INR 17,300 crore to Top worth.
4	Bhopal — Berasia Section(MPRDC,Transstroy,194 Cr)	The authority terminated the project due to delay in financial closure, nonpayment of dues to authority and delay in attaining project milestones	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
5	Bhopal Biaora section of NH-12 in Madhya Pradesh(NHAI,Transstroy,711cr)	The authority terminated the project due to delay in financial closure, nonpayment of dues to authority and delay in attaining project milestones	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
6	Hoskote-Dobbaspet Section of NH-207 in the state of Karnataka	The authority terminated the project due to nonpayment of dues to authority and default in maintenance of existing highway	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
7	Kannur section from of NH-17 in the State of Kerala(NHAI,Transstroy,1157 Cr)	Project terminated, with mutual consent by NHAI and the Concessionaire without imposing penalties on either side due to absence of Right of way	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
8	Obedullaganj to Betul section of NH-69 in the state of MP(NHAI,Transstroy , 982 Cr)	The authority terminated the project due to nonpayment of dues to authority and default in maintenance of existing highway.	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
9	Udaipur bypass in length of 23.9 km under NHDP V) CA Aug 2016	NHAI terminated the project due to failure in submission of full performance guarantees by the bankers	SBI, PNB and RBL Bank file petition before NCLT Calcutta bench to recover debt of 1700 Cr in April 2018 from MBL Infrastructure Ltd.
10	Rohtak-Jind road in length of 48.6 km NHDP-IIIA-CA 2012	NHAI had suspected diversion of funds. As of March 2017, project has been terminated due to non-poor performance of the private partner	Credit rating of Vishwaraj Infrastructure Ltd was D in July 2018 (Source:Acuite ratings and research)
11	Jetpur-Somnath section of NH-8D in length of 123.5 km CA in 2011	On 10.11.2016, NHAI issued the Termination Notice and took possession and control of the project forthwith.	Credit rating of Uniquest Infra ventures pv.t Ltd in 2018 was BB below investment grade(Source CARE ratings)
12	Patna-Buxar NH-84 Road Project-CA 2012(NHAI,Gammon ,700 Cr)	On 29 August 2014, the contract was terminated due to non-compliance of financial closure; the project will be implemented on EPC basis under three packages. Source: NHAI	Gammon Infrastructure first defaulted in October 2015. The lenders had initiated various methods to recover the dues, including CDR and SDR

13	Chhapra-Gopalganj CA 2011(NHAI,Abhijit,650 Cr)	Initiated arbitration proceedings against NHAI.The amount involved in the claim is 485 Cr. NHAI has also filed counter claim amounting to INR 1529 Cr. The matter is currently pending.	The Abhijit group has 12000 Cr debt payable to banks most of which are NPAs.The group was under CDR arrangement.
14	Rohtak-Jind road in length of 48.6 km NHDP-IIIA-CA 2012	NHAI had suspected diversion of funds.NHAI terminated contract in 2018	Credit rating of Vishwaraj Infrastructure Ltd was D in July 2018 (Source:Acuite ratings and research
15	Haridwar - Dehradun section in Uttarakhand - CA 2010 (NHAI)	Concessionaire failed to bring in promised funds due to financial problems.	insolvency plea filed by Union Bank against debt-ridden Era Infra in April 2018 to recover debt of 681 Cr.
16	HAM PROJECT (RohnaJhajjar Package 2)(NHAI,Gawar Construction)	NHAI terminated the project due to failure in obtaining financial closure in stipulated time	The company has emerged as the L1 bidder in two HAM projects, which required equity infusion of INR 200-250 crore. Company could not arrange it.
17	HAM PROJECT (NHAI,Overseas Infra, 1100 Cr)	NHAI terminated the project due to failure in obtaining financial closure in stipulated time	EPC company could not arrange the equity for financial closure.
18	Hiran river to Sindoor river stretch on NH12 (NHAI,Gawar Infra, 1049 Cr)	NHAI terminated the project due to failure in obtaining financial closure in stipulated time	The company has emerged as the L1 bidder in two HAM projects, which required equity infusion of INR 200-250 crore. Company could not arranged it
19	MBL Udaipur Bypass road (NHAI,MBL Infra,780 Cr)	NHAI terminated the project due to failure in submission of full performance guarantees by the bankers	SBI, PNB and RBL Bank file petition before NCLT Calcutta bench to recover debt of 1700 Cr in April 2018 from MBL Infrastructure Ltd.
20	Concast Ambha Road Projects Pvt. Ltd. (MPRDC,Concast Infratech,159 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.
21	Concast Damoh Road Projects Pvt. Ltd.(MPRDC,Concast Infratech,90 Cr)	The authority MPRDC, is not releasing annuity due to the concessionaire hence the Lead bank has issued notice for financial event of default.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.
22	Concast Dhaneta Road Projects Pvt. Ltd. (MPRDC,Concast, 130 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.
23	Concast Jawasa Road Proiects Pvt. Ltd. (MPRDC,Concast,75 Cr ,2012)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.

24	Concast Morena Road Projects Pvt. Ltd. (MPRDC,2012,Concast, 165 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.
25	Concast Path Bameetha Satna Road projects Pvt. Ltd. (MPRDC, 2012, Concast, 245 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	SREI Equipment filed case under IBC code against Concast Infratech to recover its loan. The Concast steel and power group facing suite filed by bank at NCLT.
26	Sarangpur Sujalpur Tollway (UPRDC, 2007,Gangotri Construction, 55 Cr)	Non achievement of Financial closure	EPC Contractor with weak financial profile could not arrange equity
27	Transstrov Bhopal Berasia Sironi Tollways Pvt. Ltd.(MPRDC,2007, Transstroy, 711 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
28	Transstroy Bhopal — Bioara Tollways Pvt. Ltd.(MPRDC,2007, Transstroy, 711 Cr)	MPRDC, terminated the project, in citing delay, non-achievement of milestones, default in payment of dues. The lenders filed legal case to recover the debt.	Canara Bank filed a petition before NCLT in Dec 2017 urging it to declare Transstroy India ltd.as bankrupt
29	Seoni - Katangi - Maharashtra border on State Highway no. 54(MPRD)	Non achievement of Financial closure	SBI, PNB and RBL Bank file petition before NCLT Calcutta bench to recover debt of 1700 Cr in April 2018 from MBL Infrastructure Ltd.
Source :IIFCL intimation to Asset Reconstruction companies for sale of terminated projects assets dated 6 March 2018,NHAI,MPRDC			

Table 5.2 Road developers and their PPP project in India

Road developers and their PPP project in India

		Operational Project				NHAI delayed/Terminated		State Terminated	
SR No	**Toll Road Developer**	**Toll Road**	**Annuity Road**	**State Road**	**Total**	**NHAI Delayed**	**NHAI Terminated**	**State Terminated**	**Total**
1	IRB Infra	8	0	3	11	4	0	0	15
2	L&T Infrastructure	7	1	3	11	2	2	0	15
3	GMR Infrastructure	5	3	1	9	0	0	0	9
4	Ashoka Buildcon	4	0	2	6	1	0	0	7
5	ITNL	4	4	5	13	5	2	0	20
6	Madhucon Projects	4	0	0	4	3	1	1	9
7	Reliance Infrastructure	4	0	1	5	3	0	0	8
8	HCC	3	1	0	4	2	3	0	9
9	JMC Projects	3	0	1	4	0	0	0	4
10	IVRCL	2	0	0	2	1	1	0	4
11	GVK	2	0	0	2	0	0	1	3
12	IJM India	2	0	0	2	0	0	0	2
13	Lanco Infratech	2	0	0	2	0	0	0	2
14	Oriental Engineers	2	0	0	2	3	0	0	5
15	Sadbhav Engineering	2	0	1	3	0	0	0	3
16	Soma Enterprise	2	2	0	4	4	0	0	8
17	Jayaswals Neco Ltd	1	0	0	1	0	0	0	1
18	Bharat Road Network	1	0	0	1	2	0	0	3
19	BSCPL Infrastructure	1	1	0	2	3	0	0	5
20	Gammon India	1	3	1	5	2	0	0	7
21	Kalyan toll Infra	1	0	3	4	0	0	0	4
22	KNR Construction	1	0	0	1	0	0	0	1
23	NCC Ltd	1	1	0	2	0	0	0	2
24	SREI Infrastructure	1	0	0	1	0	0	0	1
25	Tata Realty	1	0	0	1	0	0	0	1
26	Patel Infrastructure	0	2	0	2	0	0	0	2
27	Chetak enterprises	0	1	2	3	0	0	0	3
28	Era Infra	0	1	1	2	5	0	0	7
29	Essel Infraprojects	0	1	4	5	3	1	0	9
30	Gayatri Projects	0	1	1	2	2	0	0	4
31	Meenakshi Infra	0	1	0	1	0	0	0	1
32	PNC Infratech	0	1	1	2	1	0	0	3
33	Punj Lloyd	0	1	0	1	1	0	0	2
34	Rohan Rajdeep Tollway	0	1	0	1	0	0	0	1
35	Dilip Buildcon	0	0	4	4	1	0	0	5

36	Atlanta Ltd	0	0	1	1	1	0	2	4
37	D P Jain Infrastructure	0	0	1	1	0	0	0	1
38	Kalthia Enginnering	0	0	1	1	0	0	0	1
39	MSK Projects	0	0	1	1	0	0	0	1
40	NSPR Construction	0	0	1	1	0	0	0	1
41	OM Metal Infraprojects	0	0	1	1	0	0	0	1
42	Prakash Constrowell	0	0	1	1	0	0	0	1
43	SEW Infrastructure	0	0	1	1	1	0	1	3
44	Supreme Infrastructure	0	0	1	1	1	0	0	2
45	Transstroy	0	0	1	1	6	3	2	12
46	Valecha Engineering	0	0	1	1	0	0	0	1
47	Vishwraj Infra Ltd (VIL)	0	0	1	1	0	2	0	3
48	GVR Infraprojects	0	0	2	2	1	0	0	3
49	Ramky Infra	0	0	2	2	1	0	0	3
50	KMC Infratech	0	0	0	0	5	0	0	5
51	Galfar Engineering	0	0	0	0	2	0	0	2
52	Navayuga Engineering	0	0	0	0	2	0	0	2
53	DSC Construction	0	0	0	0	1	2	0	3
54	MBL Infrastructure	0	0	0	0	1	1	1	3
55	Shapoorji Pallonji	0	0	0	0	1	0	0	1
56	Tantia Infrastructure	0	0	0	0	1	1	0	2
57	Abhijeet Infra	0	0	0	0	0	2	1	3
58	Gawar Infrastructure	0	0	0	0	0	1	0	1
59	ISOLUX Corsan	0	0	0	0	0	1	0	1
60	Kazstroy Group	0	0	0	0	0	1	0	1
61	Overseas Infra	0	0	0	0	0	1	0	1
62	Topworth	0	0	0	0	0	1	1	2
63	KSS Petron	0	0	0	0	0	1	0	1
64	Uniquest Infra	0	0	0	0	0	1	0	1
65	Concast Steel	0	0	0	0	0	0	6	6
66	Gangotri Enterprises	0	0	0	0	0	0	1	1
		65	**26**	**50**	**141**	**72**	**28**	**17**	**258**

Table 5.3 Credit rating of Road developers in India

Credit rating of Road developers in India

SR No	Toll Road Developer	Credit rating	Total No of projects
1	IRB Infra Developer	IND A+	15
2	L&T Infrastructure	ICRA AA+	15
3	GMR Infrastructure	Rating Withdrawn	9
4	Ashoka Buildcon Limited	CRISIL AA-	7
5	ITNL	IND D	20
6	Madhucon Projects Ltd	Rating Withdrawn	9
7	Reliance Infrastructure Limited	IND C	8
8	HCC	Rating Withdrawn	9
9	JMC Projects (India) Limited	CARE A+	4
10	IVRCL	IND D	4
11	GVK Power and Infrastructure	Rating Withdrawn	3
12	IJM India Infrastructure	Rating Withdrawn	2
13	Lanco Infratech Ltd	Rating Withdrawn	2
14	Oriental Structural Engineers	CARE A-	5
15	Sadbhav Engineering Ltd	CARE A	3
16	Soma Enterprise	S4A Scheme	8
17	Jayaswals Neco Ltd	ICRA D	1
18	Bharat Road Network Ltd	ICRA BBB	3
19	BSCPL Infrastructure Ltd	CARE D	5
20	Gammon India ltd	CARE D	7
21	Kalyan toll Infrastructure	BWR BBB+	4
22	KNR Construction Ltd	CRISIL AA-	1
23	NCC Ltd	IND A	2
24	SREI Infrastructure Finance	CARE A+	1
25	Tata Realty and Infrastructure	ICRA AA	1
26	Patel Infrastructure	IND A-	2
27	Chetak enterprises ltd	CARE A+	3
28	Era Infra	NCLT	7
29	Essel Infraprojects Ltd	BWR A(so)	9
30	Gayatri Projects	CARE BB-	4
31	Meenakshi Infrastructure	BWR BB	1
32	PNC Infratech ltd	CARE AA-	3
33	Punj Lloyd	CARE A+	2
34	Rohan Rajdeep Tollways ltd	IND BBB+	1
35	Dilip Buildcon	CRISIL A	5
36	Atlanta Ltd	CRISIL D	4
37	D P Jain Infrastructure	BWR A2	1
38	Kalthia Enginnering	ICRA A-	1
39	MSK Projects	BWR BB	1
40	NSPR Construction	ICRABBB	1

41	OM Metal Infraprojects Ltd	ICRA BB	1
42	Prakash Constrowell Ltd	INDBBB	1
43	SEW Infrastructure Ltd	BWR D	3
44	Supreme Infrastructure Ltd	IND D	2
45	Transstroy India Pvt.Ltd.	NCLT	12
46	Valecha Engineering	ICRA BBB	1
47	Vishwraj Infra Ltd (VIL)	ACUITE BBB-(SO)	3
48	GVR Infraprojects Ltd	BWR C	3
49	Ramky Infra	CRISIL D	3
50	KMC Infratech Ltd	IND D	5
51	Galfar Engineering Co	IND BBB-	2
52	Navayuga Engineering	ICRA LA+	2
53	DSC Construction	ICR BB	3
54	MBL Infrastructure	BWR BB+	3
55	Shapoorji Pallonji Roads	ICRA AA+	1
56	Tantia Infrastructure	SMERA D	2
57	Abhijeet Infra	IND D	3
58	Gawar Infrastructure	ICRA BB	1
59	ISOLUX Corsan	IND D	1
60	Kazstroy Group	IND BBB-	1
61	Overseas Infra	ICRA BB	1
62	Top worth	IND D	2
63	KSS Petron	CRISIL D	1
64	Uniquest Infra Ventures	BWR BB	1
65	Concast Steel and Power	NCLT	6
66	Gangotri Enterprises	CARE D	1
	Total		**258**

5.2 Analysis of Contract and Risk management of Operational PPP projects

The projects that had been awarded to concessionaires on a PPP basis after competitive bidding are operational, collecting their revenue. Some projects have even completed their contracted life cycle. Operational Project means any Project that has: (i) achieved commercial operations following the terms of its applicable construction agreement, power sales agreement, or toll collection agreement, as the case may be; and (ii) generated operating revenue from the sale of electricity or transportation service. The financial, operational, and risk and contract management -related data of 170 operational PPP projects are presented in this section.

Table 5.4 Total Operational PPP projects in India

Total Operational PPP projects in India

Sr.No.	Sector	Number of Projects
1	NHAI Roads	128
2	State Roads	237
3	Sea Ports	42
4	Air Ports	5
5	Renewable Energy	67
6	Energy -GTD	17
7	Railway	4
8	Social and Commercial	70
9	Water and Sanitation	55
	Total	625
Source : pppinindia.gov.in		

Table 5.5 Financial Operation details of 170 Operational Projects

Financial and Operational details of 170 Operational PPP projects											
Sr. No.	**Sector**	**Total Number of projects**	**Total Debt in INR Cr**	**Total Equity in INR Cr**	**Average D/E Ratio**	**Total Estimated Project Cost in INR Cr**	**Total Actutal Project Cost**	**Total Increase in project cost in INR Cr**	**Average Increase in project cost in percentage**	**Average Time Overrun in months**	**Average concession period in years**
1	Toll Roads	65	40125	16852	2.38	37963	55910	17947	47.3	11.4	21
2	Annuity Roads	26	11292	2523	4.47	10935	13494	2559	23.4	6.46	18
3	State	50	15835	6468	2.44	16270	22301	6031	37.1	8.74	19.6
4	Sea	17	17507	4844	3.61	13454	22320	8866	65.9	7.17	28.8
5	RE	4	9649	1981	4.87	7528	11630	4102	54.5	15	35
6	Metro Projects	3	25800	8822	2.92	16631	34331	17700	106	27	56
7	Air	5	24169	4794	5.04	26489	31417	4928	18.6	6.8	36
	Grand Total/Average	**170**	**144377**	**46284**	**3.67**	**129270**	**191403**	**62133**	**50.3**	**11.7**	**30.6**

The following facts are observed in the context of risk management/Risk allocation of PPP projects

1. A large number of operational PPP Projects could not manage refinancing risk

Out of 170 operational projects, only 30 projects (17.75%) could manage to refinance their debt by raising bonds/NCDs while the rest projects failed to do so due to their weak balance sheets and credit profile and that of their sponsors. Out of these 30 projects , 12 road projects (40%) are annuity based projects receiving annuity from NHAI and were able to raise NCDs due highest rating of NHAI(AAA) and surety of getting an annuity from NHAI eliminating revenue or demand risk. The underdeveloped bond market and the absence of a vibrant takeout financing market are obstacles to the refinancing of PPP projects. In a sample of 170 operational projects 0nly 36 projects (21%) could able to refinance their debt as exhibited in table 8.22. Most of these projects were annuity -based projects where demand risk was absent

2. Toll roads could not manage Demand /Revenue Risk

In the case of toll roads, 12 projects out of 65 were observed to have their revenues less than anticipated during the operational phase. The Wholesale Price Index (WPI)-linked escalation in toll rates limited growth in toll collections due to low WPI rates. Seasonal traffic, alternative roads and maintenance issues also contributed to this issue. In the case of State roads 4 out of 50 and for Sea ports 2 out of 17 have been found to have less than anticipated revenue.

The comparative analysis of projects receiving government granst and projects awarded on the premium (negative grant) reveals that projects receiving government grants could manage risk while those implemented on the premium basis failed in managing the revenue risk. The capital grant is provided for such projects which were economically justified but financially not viable. The analysis shows that the capital grant has significantly improved the financial viability of the projects while the projects awarded on the premium basis have failed miserably. The concessionaire of such projects had requested for deferment of premium to road development authority NHAI.

3. Comparison of Toll and Annuity projects in terms of risk management

India has implemented one of the largest PPP programs in the road sector 550 road projects comprising of a total length of 50,000 km with an investment of 2.5 lac crore awarded on a PPP basis by the center and state governments. The government assumed the revenue risk in the case of annuity projects while allocating to private developers in toll road projects. With more than 75% of PPP projects executed on the toll model, it was more suitable for policymakers. The prime reason for going to the PPP route in India was to attract private capital to reduce the fiscal burden on the public sector.

In the case of annuity projects, the developer need not have to bear revenue risk but the upside potential for profit was restricted while in toll project there was unlimited profit potential but demand risk was high if the expected toll had not been collected. The private developers preferred toll roads due to an attractive risk- return equation. The Toll roads were comparatively of long distance with high project cost. The private developers considered bidding for the toll- based PPPs if they could expect a sensible risk -reward balance because the private sector by its very nature pursues the path of higher returns than setting for modest returns.

The Toll projects were comparatively larger and more complex and hence more costly. But their unit costs were lower due to the economics of scale being longer in distance. The Toll model was adopted in rich states expecting higher toll revenue. The annuity project's higher debt levels suggest that lenders anticipated a lower risk in annuity projects. But the private developers prefered investing higher equity in Toll road projects with the expectation of higher returns.

In Toll based road projects, the developer was expected to recover his investment in the projects by collecting tolls from travelers during the operation period. For NHAI Toll roads, the average concession duration was 20 years. The actual revenue in the form of tolls was less than anticipated during the bidding process. In many cases, the revenue was so low that the developer could not pay the interest on debt. The PPP projects were affected due to a slowdown in demand in the economy. The traffic diversion due to the competing roads also reduced the toll revenue significantly in many projects. The average unit cost for toll projects was INR 2.94 Cr /lane km vis-à-vis INR 1.99 Cr per lane km for annuity projects

4. Cost and Time overrun risk due to Predevelopment phase risk

Many projects could not be completed in the allotted time due to unavailability of land, right of way (ROW), environment and forest clearances. It was the contractual obligation of the authorities to make the availability of land and ROW for the contractor. But the failure of the authority to acquire the land resulted in time and cost overruns leading to an increase in interest cost during the construction phase and subsequently the projects become economically and financially unviable. The inflated project cost had hit the toll project economics. The private sector had to manage the risk of permissions, land acquisition resulting in cost overruns. The projects were not ready at the time of award of projects to the developer.

5. Risk of Aggressive biding

The aggressive bidding coupled with the optimism bias of the private sector put many projects into distressed condition. The aggressive and inadvertent bidding,without adequate due diligence in the quest for winning the project and subsequent time and cost overrun issues, made the balance sheet of the sponsor construction companies with a large portfolio of PPP projects highly stressed. Because of this, they failed in funding the mismatched cash flow and equity during the construction due to the cost overrun. For PPP projects started before 2000, the sponsors could not offload their equity till the completion of two years as per the terms in model concession agreement. This had blocked the equity of sponsors and in case of cost overrun, they could not arrange the equity by selling their stake in the project. The rule was abolished in 2013 but by that time damage had already been done in terms of stalling of projects due to the non-availability of equity.

6. Risk of underprepared projects

Toll projects were not investment ready at the time of project award as compared to annuity projects. Toll projects took an average of 12.29 months to begin construction from date of

award while for annuity road it was 10.05 months. Duration from RFQ to project award was 14 months for toll projects vis-a-vis 11 months for annuity projects suggesting that toll projects were not ready during bidding due to inadequate planning.

8. Risk of monetizing operational projects

The Indian sponsors sitting on a big debt pile did not find buyers for their monetization plan of selling operational assets due to economic slowdown. There were absolutely no buyers for the under construction projects. Another big hurdle was NHAI's contractual obligations which required a 51% stake to be withheld for two years post-COD (commercial operation date). The funds which had been locked in operational projects and stalled under construction projects and arbitration matters made it difficult for the construction companies to keep up with the interest payment on borrowed finances. In a sample of 170 operational projects, only 33 projects were sold.Out of these projects, the majority of projects were annuity based projects where revenue risk was absent.

9. Risk of inadequate financial capacity for managing long tenure project

Many Sponsors sold their stakes in operational Build-Operate-Transfer (BOT) assets. The road developers who initially focused on the projects requiring them to invest heavily and bear major risks over long periods later shifted focus to an asset-light model as the BOT model burdened them with heavy debt. The developers returned to the EPC (engineering, procurement and construction) mode due to lower risk. These firms first started with EPC business and became asset-heavy due to PPP and eventually sold their operational BOT road assets.

10. Contract Management Risk

The contracts based on model concession agreements were very rigid and lacked provisions to change as per the changing market conditions. Due to the long tenure of 15- 20 years and a lot of contingencies that cannot be expected ex-ante while designing the contract, PPP contracts are basically incomplete contracts where provisions for dealing with all the contingencies in all the states of the world cannot be included. The issue is that when an emergency occurs which is not defined in the contract, the question arises who and how will deal with that issue and who will bear the cost of managing the issue. Since there is no provision in the contract for renegotiation and there is also a fear of moral hazard, nobody including contract management team took the decision to deal with the issues. This resulted in delayed projects and subsequent cost overruns and stalling of the projects.

11. Renegotiation, Dispute resolution risk and legal risk

Due to the ack of an efficient renegotiation framework and dispute redress system and a lack of trust between the partners, issues instead of getting resolved with mutual consent entered

the territory of courts and stringent judicial process and finally resulted in the cancellation of projects.

5.3 Analysis of Contract Management of Operational PPP projects

The identification of a project for PPP is based on the principle of an appropriate and optimum technical solution or "Project". This stage involves activities like socio economic analysis, scoping the project, screening the project as PPP, financial assessment and finally giving green light to move to full scale appraisal. The Appraisal process is employed to determine the techno commercial feasibility of the project, environmental impact assessment, market and public sector comparator analysis, due diligence to assess risks, pre-structuring, defining procurement route and plan and finally permiting to float a tender.The feasibility report include affordability, commercial feasibility, Public sector comparator (PSC), Go/no go recommendation.

The tender structuring and concession drafting stage involves making appropriately structured contract and well-designed tender process, defining final structure of project contract including financial risk/payment mechanism, finalizing due diligence and preparation and clear pending issues, reassessment and confirmation of previous analysis like economic/financial/commercial/PSC/affordability, finalising reference design, technical requirement and output specification, defining other business terms and contract structure matters like contract management strategy and tools, The Structuring and drafting RFQ-define qualification criterion, structuring and drafting RFP-Define proposal requirement and evaluation criterion, finalise contract draft and giving green light for launching. The tendering and procurement is done in accordance with the applicable legal and regulatory requirement. The Award decision is taken and contract is signed with winning party.

The Contract Management involves managing asset during its contract life, setting up contract management team and strategy, oversight and approval of design, site set up and permits, completing ROW expropriation and starting the construction work.

The contract management comprises of various task such as formation of contract, bidding, selection of the contractor, monitoring construction work and resolving disputes as per contractual terms, and managing operations, revenue collection and return of the asset back to the authoritiesas after the end of the contract per contract.The Analysis of 150 stalled, delayed and terminated projects has revealed the following aspects of contract management in various infrastructure subsectors.

1. Contractual issues in the road sector

In the road sector, it is observed that 19 toll roads out of 65((30%) and 12 annuity roads out of 26(46%) had faced contractual issues. In the case of state roads, 21 out of 50(42%) faced contractual issues.

The various contractual issues observed are:

a) Bankrupt project sponsors

b) Alternate road affecting revenue

c) Dispute between authority and concessionaire

e) Toll exemption by the state government like Gujarat and Maharashtra

f) Nonpayment of grant/annuity by authority

g) Step in by the lender in case of a bankrupt concessionaire

h) Termination of the project from either side.

i) Change in design and scope of the project

2. Contractual issues in Metrorail PPP projects

a) Time and cost overrun in case of the Hyderabad Metro and Mumbai Metro

b) Bankruptcy of sponsor in case of Mumbai Metro and denial to hike fair by the authority and court.

c) Lower than expected revenue in the case of Gurgaon Metro.

3. Contractual issues in hydropower PPPs

Six operational projects faced the following contractual issues:

a) Decline in short-term merchant power prices results in and decline in revenue.

b) A drop in water availability

c) Bankrupt sponsors like JP Hydro and Lanco.

4. Contractual & Regulatory Issues in Airports

i. CAG Report about irregularities in the bidding process of Mumbai and Delhi PPP Airports

The Comptroller and Auditor General of India (CAG) in its performance audit report, blamed the Civil aviation ministry and Airport Authority of India for failure in monitoring project and offering undue benefit of 6000 crore to the SPV Mumbai International Airport Ltd (MIAL) of GVK power who was awarded the PPP project of Mumbai airport modernization.The Public Accounts Committee initiated special audit on the Delhi PPP airport SPV acting on CAG's

report. The CAG, in its report blamed the aviation ministry allowing Delhi International Airport Ltd (DIAL) "post-contractual benefits that violated the tendering process by which the joint venture partner was selected". In its defense AAI claimed that the fair value of land can be calculated after removal of slums and encroachments on the land

ii. Changes in contractual terms for bidding of Six Airports in 2018

In 2018, the government decided to offer six airports run by AAI to be operated on PPP basis after a gap of 16 years since modernisation of Mumbai and Delhi airport in 2006.The Greenfield airports Hyderabad and Bengaluru were also awarded at the same time. The government expects this will keep airport charges under control. Five airports, Delhi, Mumbai, Bengaluru, Hyderabad and Kochi, operate under the PPP model, which helped create world-class airports and helped AAI in enhancing its revenues and focusing on developing airports and air navigation infrastructure in the rest of the country.In the second round of PPP airport, the concession period enhanced from 30 years to 50 years. Apart from the operations, the selected contractor was responsible for design, finance and construction of allied infrastructure at the airport. The criterion for selection was changed from revenue sharing model to contractor agreeing to pay highest passenger fee on monthly basis to AAI.The Trade Union raised objections over airports to private sector through PPP route at the cost of public money

iii. Airport privatization & freedom to operators

The success of the airport privatisation depends on the clarity about availability of land, exit process and freedom in terms of day to day operations. The revenue sharing formula was not used Kolkata and Chennai. The revenue sharing mechanism for Delhi has some issues. There have been some problems on account of higher revenue share pay-out. This means that there could be fee-based mechanism rather than a revenue-sharing one.

iv. Airports Economic Regulatory Authority of India (AERA)

AERA is a regulating authority for airport sector.The airports get the revenues from airlines, user development charges and non-aeronautical revenue. AERA determine tariff based on return on equity. The Delhi airport share 45% of its revenue with AAI.The Directorate General of Civil Aviation (DGCA) is another regulator of safety operations of airline industry and fares of services. It is required to combine the two regulators into one single regulatorThe private airport operator prefers dual-till model where aeronautical revenue is considered as against hybrid till where non-aeronautical revenue is also considered for revenue sharing. The airports in Delhi and Mumbai works under the hybrid-till model where the sources of non-aeronautical revenue are charges collected from retail shops in airports, parking charges, food services charges

v. Increased charges at PPP airports

The cost overrun in PPP projects is compensated by charging higher user fees and airlines. There was no regulatory framework available when Mumbai and Delhi airport were developed hence conflict between airport operator and AERA about type of till to be applied. The delay

in tribunal determining about tariff awards and financial distress of airlines are key challenges of airports in India.

5. Contractual issues in Seaports

i. Issues in old BOT contracts

The PPP projects in the sector facing litigation due land, dredging facility, rates and environment clearances. The projects have also collapsed due to non-compliance of contractual obligations by the port trusts. The problem is in the way concession agreements are designed for 30 years without provision for review and amendment. Even the Constitution can be amended, but not concession agreements. E.g. the consultants had claimed the cargo terminal run by Sterlite Ports at Vizag would be able to evacuate four lakh tons of coal every 10 days. On that basis, they worked out a capacity of 10.2 million tons of cargo a year. They did not check if importers were willing to take the cargo out in 10 days and if the port would give them adequate rakes. It's a total design fault, but the consultants go scot free. The main issue of seaport sector is the frequently changing tariff regime that was always made applicable prospectively, leaving the existing terminals stranded. The regulator of sea ports, Tariff Authority for Major Ports (TAMP) regulates the tariff in the sector.

In sea port sector 75 PPP projects implemented with installed capacity of 600 MMTPA with estimate cost of 50000 crore. The nine projects implemented pre 2001 without any MCA,then 15 projects from 2001 to 2006 under standard agreement and the next 49 projects under MCA developed by shipping ministry. There are 16 existing port contracts (10 of them private) operating from as far back as 1997 where contract were made in a regulated set-up before these regulations. On an average, these existing contracts have about still 10 years or more to end their term of 30 years. These projects also need to get benefit of market-driven pricing regime announced in 2013 by moving from pre-TAMP to current TAMP regulations.

ii. Terminations and Issues with MCA

Five PPP projects had been terminated and many were financially stressed in shipping sector due to MCA's rigidity to respond to changes in market conditions. The use of the escrow account for revenue over complete project cycle tied up the capital of the developer. Certain provision in MCA such as free storage for only 10 days as against universal norm of 30 days are not market friendly.

iii. Levying accountability on the concessioning authority

Despite the provision of imposing penalty on failing authority in terms their obligations of providing land or dredging facility, none of the major ports were imposed any penalty in the past. Such a delay added to the financial cost of the private developers making projects financially stressed.

iv. Need for flexibility in specifying minimum guaranteed cargo (MGC) Due to volatility in international market conditions and government policies, the cargo volume also affected hence flexibility in the provision for MGC, after factoring in such impacts needs to be provided.

6. Cancellation/Terminations of Projects

NHAI terminated many road projects. The government needs to take charge of such projects due to their public service obligations.The various reasons for termination of PPP projects are:

a) Given the PPP rush, little thought was given to project design and viability.

b) Total lack of transparency-even after deal was signed. The terms and conditions have been changed to favor private developer,

c) Project contractor offering unsustainable bids makes demand for traffic and renegotiation inevitable.

d) Lack of regulation resulting in public assets transferred without proper evaluation

7. Failure of Dispute Redresser framework in PPP

The contract management under MCA was complex. Many times authority were faced with different views and interpretations by various stakeholders. This has led to legal disputes claims against authority. There were a large number of litigations in highway projects due to land acquisition, environment and other permissions.

8. Various reasons for failure in contract management

i) The PPP contracts were observed to be rigid and lack provision to change as per market conditions. The contract fails in managing uncertainaties.This results into cremegotiations.But there was no pre-setting of conditions that should be accepted as valid reasons for a request for renegotiation. No ex-ante provisioning was made for renegotiation framework in the bid document. In the road sector, the contract lacked the provision to extend the "tolling period" of delayed projects facing time overruns for reasons not attributable to the developer.

ii) The Focus in PPP contracts was on the short term transactions than long term relationship between public and private partners. There was inequitable risk allocation among different stakeholders.

iii) Most decisions were based on the incomplete information due to uncertainties involved. A decision that looked problematic ex-post was treated as mala fide in public domain. This led to the policy and decision making paralysis.

iv) The difficulties were experienced with long-term PPP projects when parties were in dispute or unanticipated events led to recourse to traditional long drawn out legal systems for resolution.

v) A key issue in the context of a budget overrun was identification of who should pay for the construction budget overrun.

vi) Adoption of the Model Concession Agreement (MCA) led to non-addressing of project specific risks by project authorities adhering to "One-size-fits-all" approach.

vii) The basic principle that "the entity that is best suited to manage the risk is allotted that risk" was not followed.

viii) Typically infrastructure PPP projects span over 20-30 years and a developer often loses bargaining power related to tariffs and other matters in case there are abrupt changes in the economic or policy environment which is beyond his control.

5.4 Analysis of Risk Management in Operational PPP projects

a) Debt refinancing /Sponsor's support

It improves credit ratings and liquidity of infrastructure projects and facilitates cheaper debt reducing financial and overall cost of the projects. Very few projects were successful in refincing their debt.

b) Demand /Revenue Risk

The Toll is collected from users of National Highways as per National Highways Fee rates and collection rules and terms of the concession.The wholesale price index (WPI) is taken into account for the increase in toll fee. In WPI, the representation of construction-related aggregates is a mere 14%. To increase the toll fee on a specific project, NHAI have a formula of 3% increase in base rate plus WPI. If WPI is negative, the toll doesn't increase.

Table 5.8 gives details about projects which faced demand risk and less than expected revenue affecting the economics of the projects.

Table 5.6 Less Than Expected Revenue/Toll in PPP Project

LESS THAN EXPECTED REVENUE/TOLL IN PPP PROJECT			
SR. No.	Sector	Name of the project	Issue observed in the project
1	NHAI operational toll roads	GMR Hyderabad Vijayawada Expressways	Delays in debt servicing and f lower than-anticipated toll resulting into hugh losses. GVHEPL is required to share 35% of its revenue to NHAI as per the Concession Agreement (CA)
2	NHAI operational toll roads	GMR OSE Hungund Hospet Highway Private Limited	Delays in debt servicing by the company owing to inadequate toll collections as the traffic on the project stretch remains weak. The concentration of the project's revenues on the iron-ore carrying trucks, which exposes the company's earnings to the cyclicality in the steel industry.

3	NHAI operational toll roads	IRB Pathankot Amritsar Toll Road Private Limited	The muted WPI has led to lower-than-expected revenues. Leakages in toll collection. Increase in operating expenses.200 meters of land remaining to be handed-over from NHAI to the company to complete the construction.
4	NHAI operational toll roads	Lanco Devihalli Highways Private Limited	Lower than expected toll revenue, high financial cost, Liquidity issue of sponsor Lanco group
5	NHAI operational toll roads	Trichy Thanjavur Expressways Limited (Madhucon)	The continued under performance of traffic has constrained the liquidity of TTEL.The rise in toll collections largely driven by increased pilgrimage activities in Thanjavur; the toll collections continue to remain significantly below expectations when compared to initial projected levels .The route is not an arterial one and that it does not connect any major ports
6	NHAI operational toll roads	TD Toll Road Private Limited(Reliance Infra)	low traffic density on the stretch
7	NHAI operational toll roads	IRB Pathankot Amritsar Toll Road Private Limited	The revenue underperformance is mainly on account of significantly lower than estimated traffic count and negative wholesale price index (WPI) numbers. The toll rates are based on a fixed increase of 3% plus 40% increase in the WPI every year. a consistent downward trend in WPI data.
8	NHAI operational toll roads	BSCPL Godhra Tollways Limited	An average daily toll collection of R19-20 lakh as against internal estimates of the company of R29-30 lakh toll collection daily.
9	NHAI operational toll roads	L&T Panipat Elevated Corridor Private Limited	Negative variation in the actual traffic levels as compared to the company's and ICRA's initial estimates.
10	NHAI operational toll roads	TN (DK) Expressways Limited	TNDK's toll collections have been significantly below expectations on account of continued weak traffic flow witnessed on the stretch. Although the company had gone for debt restructuring in December 2012, the continued under performance of traffic has constrained the liquidity of TNDK.
11	NHAI operational toll roads	Kurukshetra Expressway	Lower than anticipated traffic volume and revenue, led to significantly lower cash flows.

12	NHAI operational toll roads	Khed Sinnar Expressway	Toll revenue is less than anticipation

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Chapter 6
Findings and Discussions

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6.1 Cost Comparison of PPP and Traditional procurement based Government Projects

The cost comparison of a sample of NHAI projects implemented on a traditional procurement basis (287 projects) Vis a Vis a PPP basis (287 projects) is conducted.

Objective: To compare project cost of PPP projects and government traditional procurement based projects.

H10: There is no significant difference in the project cost of PPP projects and government traditional procurement based projects.

H11: There is no significant difference in the project cost of PPP projects and government traditional procurement based projects.

To test this hypothesis, the project cost (the estimated total project cost as per concession agreement) of 287 highway road projects of the National Highway Authority of India(NHAI)

based both on traditional procurement method (Rate contract and EPC) and PPP based projects is compared statistically.

Paired T- test for difference in transaction cost is used for this purpose. The SPSS output of the Paired T- test has been reproduced below.

Table 6.1 Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Government Infrastructure Projects (Traditional Procurement)	435.317247	287	393.5401543	23.2299408
	Government Infrastructure Projects (PPP)	904.389477	287	706.7022303	41.7153137

Table 6.2 Paired Samples Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Government Infrastructure Projects (Traditional Procurement) - Government Infrastructure Projects (PPP)	-469.072	838.2111	49.47804	-566.46	-371.685	-9.48	286	0

The ‘p’ = 0.00. Since $p < \alpha$, the null hypothesis is rejected, and it is concluded that there is a significant difference in the project cost of NHAI PPP projects and NHAI Traditional procurement based projects .

The mean project cost of NHAI PPP projects is 904.38 INR core while the mean project cost of NHAI traditional procurement based projects is 435.31 INR core. ***The project cost of PPP projects is 207.75 % higher than a traditional procurement projects.*** A statistical significant difference is ascertained in the project cost of NHAI PPP projects and NHAI Traditional

procurement based projects through T test in a sample of NHAI projects which are implemented on traditional procurement method basis (287 projects) and PPP basis (287 projects).

The formation of these partnerships is a highly time-consuming activity. For the government, identification of the project and its objectives, identification of the public institution and finally the selection of the private partner consumes a lot of resources. Governments, inevitably, face a lot of competing priorities for social expenditures and it may be innumerable inter-departmental meetings before the final projects are selected. While the identification of the public institution may be relatively easy, the selection of the private partner could take many months. Invitation of bids through Request for Proposals (RFPs) and evaluating these bids on defined criteria could become more complicated in case of complex or high-valued projects. Cases of tenders or bids being cancelled in such projects are not unheard of. Such instances put tremendous pressure on the fiscal health of governments. Further, even if the bids do get selected, project completion times get extended with each party blaming the other as the cause of the same.

The complex risky bidding procedure adopted in PPP model leads to high transaction costs in public infrastructure projects. The transaction costs include the costs of information, negotiation, opportunity cost, time and effort spent, contract monitoring and enforcement cost, information cost during procurement and cost due to changes in design and scope. The transaction costs also increase while availing costly expertise services from external consultants. The higher transaction cost in turn resulted in higher overall project life cost. The appropriate scientific selection of procurement mode for a given project reduce the cost and enhances value for money.

An optimum risk allocation risk among the project partners who can manage it effectively is key in reducing the transaction cost but failure to do so results in hike in contingency cost, contract monitoring and enforcement and legal disputes cost. The transaction cost is a significant constituent of total life cycle cost of the PPP project and higher project cost can be justified only if the project can generate positive value for money generated through higher efficiency of private sector participants and inbuilt incentives to complete the project faster.

6.2 Financial Performance of Operational PPP projects

Analysis of the financial performance of 170 operational PPP projects in terms of Financial returns (IRR for project and equity investors) for different infrastructure subsectors using the hypothetical financial model revealed the following results:

1. Financial returns of operational PPP projects (PIRR and EIRR)

i) Positive financial Returns of the PPP projects (PIRR) are observed in 77% cases. The rest of the projects have incurred negative PIRR and destroyed the value for money for the project.

ii) Only 38% of projects have given positive returns to equity investors/ private concessionaires (EIRR). In the rest of the projects equity investors have lost their money due to negative EIRR.

iii) The financial performance of the toll road is observed to be very disappointing. Out of 65 toll road projects in our sample, only 41 (63%) projects have created positive returns (PIRR) and only 16(25%) projects have rendered positive returns for the concessionaires (EIRR).The annuity roads have done comparatively well with positive EIRR for 12 projects out of 26(46%) projects and positive returns to project (PIRR) in all 26 cases (100%).

Iv) In case of State roads, 18 projects out of 50 projects (36%) have created positive returns (EIRR) for sponsors and positive PIRR for 40 projects (80%).

v) In case of Sea ports positive EIRR for 12 projects out of 17(66%) and positive PIRR for 14 projects out of 18 projects.(77%).In Airport sector all five projects in sample have created positive PIRR and EIRR while for hydro based PPP power projects all 4 projects created positive PIRR and 3 projects created positive EIRR.

vi) The performance is starkly disappointing for Metro rail projects.All the three projects in case of Metro rail have created negative PIRR as well EIRR.

6.3) Time and Cost overrun of Operational PPP projects

i) The toll roads have an average cost overrun of 48% and a time overrun of 12 months vis-à-vis cost overrun of 24% and a time overrun of six months for annuity projects and a 35% cost overrun and nine months time overrun for state roads.

ii) Seaports have observed a cost overrun of 65% and a time overrun of 7 months while airports have an average cost overrun of 18% and a time overrun of 7 months.

iii) Hydro energy projects have a cost overrun of 54% and a time overrun of 15 months while Metro rail projects have a cost overrun of 106% and time overrun of 27 months.

The regression analysis indicates that the inflated project cost due to cost overruns negatively impacts the Equity IRR of the project. Whereas higher concession duration, higher debt -equity ratio, higher equity, and higher Project IRR positively affect the Equity returns to the concessionaire of the project.

A large number of under - construction are observed either to be delayed, stalled and even cancelled/terminated by both parties. Even some operational projects were found to be cancelled/terminated during the operational phase after completing the construction.

The Statistical Analysis reveals the following causes of termination of projects:

i) Financially weak sponsor

ii) Dispute between parties on revenue sharing

iii) Inefficient contractor

iv) Land acquisition delay

v) Nonreceipt of grant/annuity from the government.

The Statistical Analysis reveal following causes for delayed and stalled projects:

i) Land acquisition delay
ii) Financially weak sponsor
iii) Dispute between parties
iv) Forest land issue
v) Inefficient Contractor either operationally or financially or both.
vi) Less than expected revenue during operations

6.4 Analysis of causes of time and cost overrun of PPP projects

The analysis of short cases (caselets) of operational projects described in chapter 7 has revealed the following causes of time and cost overrun of operational PPP projects

Reasons for Time Overrun

1. Land Acquisition and Resettlement

The biggest problem in the transport, airport, railroad and metro sector in India was getting land for the project and a prime reason for delay of projects. In federal land is a common subject for center and states and states provides land for center projects. But there had been incidences where state authorities had not cooperated proactively to make available land or resolved land related issues. This lack of coordination between center and states in term of acquiring land had delayed and stalled many projects. The concessionaire received delayed Right of Way to complete the construction work. In certain projects certain patches of the projects were delayed. Land acquisition had been a chronic problem in road projects, some of which never took off.

India is an agriculture country where more than 70% of people are involved in agricultural activities for livelyhood.For Indian farmers, their fertile land is the most precious resource and hence they are always reluctant to offer their land for infrastructure projects. Since land comes under the states list in federal structure of India, many central government infrastructure projects in case of non-cooperation for land acquisition. Due to this, the concessionaire gets delayed in getting Right of Way (ROW) to complete his construction work. In certain projects, certain patches of the projects are delayed. Land acquisition has been a chronic problem in road projects, some of which never took off.

The compensation is calculated as market price plus 100% in an urban area and 400% in rural areas plus damages if done to standing crops. In urban area, 20% of developed land is required to given to farmers. The act made the social impact assessment of the project mandatory. To expedite land acquisitions for infrastructure projects, in land acquisition bill 2015, the government proposed exemptions from provisions of land acquisitions for defense, rural infrastructure, PPP projects. The PPP infrastructure projects require large land acquisition resulting in large- scale displacement of people and destruction of the natural environment and hence face challenges in getting land and environment clearance for such projects.

2. Environmental and forest clearance

The delay in getting the permissions delayed many projects. In some cases, permission from National Green Tribunal (NGT) is also required which significantly delayed projects. 230 plus run- on river hydropower projects were started with great enthusiasm in water- rich states like Arunachal Pradesh, Himachal Pradesh, Sikkim and other North Eastern states. But because of not getting forests and environmental clearances, this project could not progress beyond the preconstruction phase in last ten years.

The environmental clearance for infrastructure is given by Environment and forest Ministry after a rigorous assessment of the impact of project activities on the natural environment. The responsibility of giving environmenal permission lies with both the central and state government based on the category of the projects as A (central government) and B (state government) classified according to size, area and impact on human health and the natural environment of the project. At the state level, the projects are further classified as B1 and B2 where B1 projects require to do the environment Impact assessment.

The Environmental Impact Assessment (EIA) is conducted by a consultant approved by the quality Council of India to scrutinize the adverse impact on the environment due to project activities and forms the important basis of final environmental permission. The EIA evaluates the rise of pollution levels and air quality due to the proposed project and evaluates environmental cost -benefit and environment management plan of the project. The final EIA report is assessed by the central EAC or State EAC, depending on the category of the project, and decides whether to accept or reject the project. The project managers are desired to submit environment compliance reports during various phases of the project to the regulator every six months which are displayed in the public domain. In case of noncompliance, the penalty is imposed on the concessionaire by the regulator and in case of extreme violations the project is terminated.

3. Delay in getting various permissions and clearances

Delays also occur getting in railway clearances and local municipal permissions. In some cases permissions required from National Green Tribunal (NGT) also significantly delay projects.

4. Delay due to financial problems

i) Delay in getting financial closure.

ii) Many sponsors are unable to provide long- term and working capital for project SPVs.

iii) The developers who aggressively bid to get the award of the project without adequate due diligence are not in a position to infuse required equity in such a project.

iv) As per provisions in the concession agreement, the concessioner was not allowed to take out infused equity in the project till the completion of two years of operations which blocked their capital to be used in further projects. With projects getting delayed the equity is blocked for a longer duration.

5. The imprecisely defined scope of work and specifications & Changes in project scope.

6. Lengthy litigations.

7. Delay in shifting of utilities.

The reasons for cost overrun are:

1. Time overrun/delay for various reasons

2. Starting construction work without securing the needed finance

3. Operational issues.

4. Disputes over project scope specifications among parties

5. Ambiguity in provisions of the handover of the project site.

6. There was a misunderstanding between the authority and developer about the project milestones- related responsibilities in terms of who, when, and how to deliver the output.

6.5 Risk management of PPP projects

Following facts are observed in the context of risk management/Risk allocation of PPP projects

A large number of operational PPP Projects could not manage refinancing risk

Out of 170 operational projects, only 30 projects (17.75%) could manage to refinance their debt by raising bonds/NCDs while the rest projects failed to do so due to their own weak balance sheets and credit profile and that of their sponsors. Out of these 30, 12 road projects (40%) are annuity based projects receiving an annuity from NHAI and were able to raise NCDs due highest rating of NHAI(AAA) and surety of getting annuity from NHAI eliminating revenue or demand risk. The underdeveloped bond market and the absence of a vibrant takeout financing market are obstacles to the refinancing of PPP projects.

Toll roads could not manage Demand /Revenue Risk

In the case of toll roads, 12 projects out of 65 were observed to have their revenues less than anticipated during the operational phase. The Wholesale Price Index (WPI)-linked escalation in toll rates limited growth in toll collections due to low WPI rates. Seasonal traffic, alternative roads and maintenance issues also contributed to this issue. In the case of State roads, 4 out of 50 and for Sea ports 2 out of 17 have been found to have less than anticipated revenue.

The comparative analysis of projects receiving government granst and projects awarded on the premium (negative grant) reveals that projects receiving government grants could manage risk while those implemented on a premium basis failed in managing the revenue risk. The capital grant is provided for such projects which were economically sound but financially weak. The analysis shows that the capital grant has significantly improved the financial viability of the

projects while the projects awarded on the premium basis have failed miserably. The developers of such projects had demanded premium deferment to the road development authority NHAI.

In the case annuity projects, the developer need not have to bear revenue risk but the upside potential for profit was restricted while in the toll projects there was unlimited profit potential but demand risk was high if the expected toll had not been collected. The private developers preferred toll roads due to the attractive risk-return equation.The Toll roads were comparatively of longer distance with high project cost. The private developers considered bidding for the toll based PPPs if they could expected a sensible risk reward balance because the private sector by its very nature pursues the path of higher returns than settling for modest returns.

The Toll projects were comparatively larger and more complex and hence more costly. But their unit costs were lower due to the economics of scale being longer in distance. In Toll based road projects, the developer was expected to recover his investment in the projects by collecting tolls from travelers during the operation period. For NHAI Toll roads, the average concession duration was 20 years. The actual revenue in the form of tolls was less than anticipated during the bidding process. In many cases, the revenue was so low that the developer could not pay the interest on the debt. The PPP projects were affected due to a slowdown in demand in the economy. The traffic diversion due to the competing road also reduced the toll revenue significantly in many projects. The average unit cost for toll projects was INR 2.94 Cr /lane km vis-à-vis INR 1.99 Cr per lane km for annuity projects.

Cost and Time overrun risk due to Predevelopment phase risk

Many projects could not be completed in the allotted time due to unavailability of land, right of way (ROW), environment and forest clearances. It was the contractual obligation of the authorities to make the availability of land and ROW for the contractor. But the failure of the authority to acquire the land resulted in time and cost overruns leading to an increase in interest cost during the construction phase and subsequently the projects become economically and financially unviable. The inflated project cost had hit the toll project economics. The private sector had to manage the risk of permissions and land acquisition resulting in cost overrun. The projects were not ready at the time of award of projects to the developer.

Risk of Aggressive biding

The aggressive bidding coupled with the optimism bias of the private sector put many projects into distressed condition.The bidding, without proper due diligence only for getting the award of the project and subsequent time and cost overrun issues, made the balance sheet of the sponsor construction companies with large portfolios of PPP projects highly stressed. Because of this, they failed in funding the mismatched cash flow and equity during construction due to the cost overrun. For PPP projects started before 2000, the sponsors could not offload their equity till the completion of two years as per the terms in the model concession agreement. This had blocked the equity of sponsors and in case of cost overrun, they could not arrange the equity by selling their stake in the project. The rule was abolished in 2013 but by that time

damage had already been done in terms of stalling of projects due to the non-availability of equity.

Risk of underprepared projects

Toll projects were not investment ready at the time of project award as compared to annuity projects. Toll projects took an average of 12.29 months to begin construction from the date of award while for annuity roads it was 10.05 months. Duration from RFQ to project award was 14 months for toll projects vis-a-vis 11 months for annuity projects suggesting that toll projects were not ready during bidding due to inadequate planning.

Risk of monetizing operational projects

The Indian sponsors sitting on a big debt pile did not find buyers for their monetization plan of selling operational assets due to the economic slowdown. There were absolutely no buyers for the under- construction projects. Another big hurdle was NHAI's contractual obligations which required a 51% stake to be withheld for two years post-COD (commercial operation date). The funds which had been locked in operational projects and stalled under construction projects and arbitration matters made it difficult for the construction companies to keep up with the interest payment on borrowed finances.

Risk of inadequate financial capacity for managing long tenure project

Many Sponsors sold their stakes in operational Build-Operate-Transfer (BOT) assets. The road developers who initially focused on the projects requiring them to invest heavily and bear major risks over long periods later shifted focus to an asset-light model as the BOT model burdened them with heavy debt. The developers returned to the EPC (engineering, procurement, and construction) mode due to lower risk. These firms first started with EPC business and became asset-heavy due to PPP and eventually sold their operational BOT road assets.

Contract Management Risk

The contracts based on model concession agreements were very rigid and lacked provisions to change as per the changing market conditions. Due to the long tenure of 15- 20 years and a lot of contingencies that cannot be expected ex-ante while designing the contract, PPP contracts are basically incomplete contracts where provisions for dealing with all the contingencies in all the states of the world cannot be included. The issue is that when an emergency occurs which is not defined in the contract, the question arises of who and how will deal with that issue and who will bear the cost of managing the issue. Since there is no provision in the contract for renegotiation and there is also a fear of moral hazard, nobody including the contract management team decided to deal with the issues. This resulted in delayed projects and subsequent cost overruns and stalling of the projects. Even if someone takes a decision, due to the absence of a proper renegotiation framework, such decisions were looked upon with suspicion which ultimately resulted into policy and action paralysis in terms of project and contract management.

6.6 Contract Management in PPP

The identification of a project for PPP is based on the principle of an appropriate and optimum technical solution or "Project". This stage involves activities like socio- economic analysis, scoping the project, screening the project as PPP, financial assessment and finally giving green light to move to full -scale appraisal. The Appraisal process is employed to determine the techno -commercial feasibility of the project, environmental impact assessment, market and public sector comparator analysis, due diligence to assess risks, pre-structuring, defining procurement route and plan and finally permitting to float a tender. The feasibility report includes affordability, commercial feasibility, Public sector comparator (PSC), Go/NO GO recommendation.

The tender structuring and concession drafting stage involve making an appropriately structured contract and a well-designed tender process, defining final structure of the project contract including financial risk/payment mechanism, finalizing due diligence and preparation and clear pending issues, reassessment and confirmation of previous analysis like economic/financial/commercial/PSC/affordability, finalising reference design, technical requirement and output specification, defining other business terms and contract structure matters like contract management strategy and tools, The Structuring and drafting RFQ-define qualification criterion, structuring and drafting RFP-Define proposal requirement and evaluation criterion, finalise contract draft and giving the green light for launching. The tendering and procurement is done in accordance with the applicable legal and regulatory requirement. The Award decision is taken and contract is signed with winning party.

Contract Management involves managing assets during their contract life, setting up a contract management team and strategy, oversight and approval of the design, site setup and permits, completing ROW expropriation and starting the construction work. The monitoring phase involves managing charges, claims and disputes, commissioning, the start of the operation, monitoring performance and managing claims of concessionaire and dispute resolution during operation, approving changes, hand back and finalization.

The contract management issues observed in various infrastructure subsectors

1. Contractual issues in the road sector

In the road sector, it is observed that 19 toll roads out of 65((30%) and 12 annuity roads out of 26(46%) had faced contractual issues.In the case of state roads, 21 out of 50(42%) faced contractual issues.

The various contractual issues observed are:

a) Bankrupt project sponsors

b) Alternate road affecting revenue

c) Dispute between authority and concessionaire

e) Toll exemption by the state government like Gujarat and Maharashtra

f) Nonpayment of grant/annuity by authority

g) Step in by the lender in case of a bankrupt concessionaire

h) Termination of the project from either side.

i) Change in design and scope of the project

2. Contractual issues in Metrorail PPP projects

a) Time and cost overrun in the case of Hyderabad Metro and Mumbai Metro

b) Bankruptcy of sponsor in case of Mumbai Metro and denial to hike fair by the authority and court.

c) Lower than expected revenue in the case of Gurgaon Metro.

3. Contractual issues in hydropower PPPs

Six operational projects faced the following contractual issues:

a) Decline in short-term merchant power prices results in and decline in revenue.

b) A drop in water availability

c) Bankrupt sponsors like JP Hydro and Lanco.

4. Contractual & Regulatory Issues in Airports

a) Comptroller and Auditor General (CAG) in its report alleged authority to extend undue favour to the concessionaire which has affected the public interest.

b) User fees have shot over the roof in Delhi, Mumbai and Bangalore airports which are developed on PPP basis

c) In the Bidding for Six Airports on the PPP basis in 2019 five bids were won by a sing party showing the absence of competition or aggressive bidding.

d) AAI gets a share in the revenue from the Delhi and Mumbai airports. The conflict is observed between Concessionaires and authority in terms of sharing of revenue. In the recent bidding, AAI has switched from a revenue-sharing to a fee-based mechanism.

e) Government scheme UDAN scheme is creating operational issues for major airports

f) The PPP airports had shown excellent revenue growth mainly due to non-aeronautical revenue clubbed with higher traffic and the hike in aeronautical charges

g) The Navi Mumbai airport was conceived as the existing airport's capacity has reached its peak capacity. The traffic allocation between the old and the new airport is crucial for the financial viability of the new airport.

h) Various awards given by the Airports Economic Regulatory Authority of India, independent regulator are challenged by concessionaires.

i) The improvement in the airport sector in terms of tariff regulation, commercialization of land and creating higher efficiency and viability of airlines are required.

j) During the first wave of PPP airports contract aspects such as tariff fixation, regulation and development agreement were not addressed post -reward efficiently

5. Contractual issues in Seaports

a) Many PPP projects stalled and terminated due to disputes between authority and developer about contractual issues such as rates and facility to be provided by the authority due to rigid regulation not flexible enough to respond to changes in market conditions.

b) The main issue of seaport sector is the frequently changing tariff regime that was always made applicable prospectively, leaving the existing terminals stranded.

c) The cargo owners expressed discontent about decision of abolishing TAMP.

d) Private ports growing faster than major ports raising questions about institutional capacity of major ports.

e) The conflict of interest between center and state government has resulted into three seaports for transshipment in the vicinity defeating objective of creating world class transshipment facility.

f) Flexibility in specifying minimum guaranteed cargo (MGC) and efficient monitoring is required from port authorities.

g) The optimum risk sharing pattern between the government and the private investor required to be established.

h) A sound dispute resolution mechanism to avoid litigations in the sector.

6. Cancellation/Terminations of Projects

NHAI terminated many road projects. The government needs to take charge of such projects due to their public service obligations.The various reasons for the termination of PPP projects are:

a) Given the PPP rush, little thought was given to project design and viability.

b) Total lack of transparency-even after the deal was signed. The terms and conditions have been changed to favour private developers,

c) Project contractor offering unsustainable bids makes a demand for traffic and renegotiation inevitable.

d) Lack of regulation resulting in public assets transferred without proper evaluation

7. Failure of Dispute Redresser framework in PPP

The contract management under MCA was complex. Many times authority were faced with different views and interpretations by various stakeholders. This has led to legal disputes and claims against the authority. There were a large number of litigations in highway projects due to land acquisition, environment and other permissions, changes in design and scope, deviations in terms of contractual obligations

Various reasons for failure in contract management

i) The PPP contracts were observed to be rigid and lack provision to change as per market conditions. There was no provisions in PPP concessions to handle uncertainitities and risk during operations.

ii) The Focus in PPP contracts was on short term transactions than long- term relationships between public and private partners. There were inequitable risk allocation among different stakeholders.

iii) The difficulties experienced with long-term PPP projects when parties were in dispute or unanticipated events led to recourse to traditional long -drawn -out legal systems for resolution.

iv) A key issue in the context of a budget overrun was the identification of who should pay for the construction budget overrun.

v) Adoption of the Model Concession Agreement (MCA) led to the non-addressing of project-specific risks by project authorities adhering to a "One-size-fits-all" approach.

vi) The basic principle that "the entity that is best suited to manage the risk is allotted that risk" was not followed.

vii) Typically infrastructure PPP projects span over 20-30 years and a developer often loses bargaining power related to tariffs and other matters in case there are abrupt changes in the economic or policy environment which is beyond his control.

viii) Devoid of the contractor from getting the payments by an authority created working capital management and liquidity problems for the developers.

6.7 Initiatives in terms of Operating models and Financing of PPP Projects

Financing Initiatives

PPP projects under project finance structure are highly leveraged with a debt equity ratio of 80:20.These projects faced challenges such as high debt from commercial banks facing asset-liability mismatch. The bond market in India in India is under-developed less liquid and has no depth and is largely dominated by Public sector units and bank and financial institutes bonds leaving no room for infrastructure bonds. Enough funds cannot be availed from long - term investors such as pension funds and insurance companies due to regulatory constraints of investing in government securities and foreign debt in the form of ECB were restricted by the Reserve bank of India to maintain macroeconomic stability. So the infrastructure SPVs faced challenges in mopping up the debt for the project.

The commercial banks and NBFCs were the largest provider of debt with the issue of asset-liability mismatch due to longer tenure debt to infrastructure projects having to be matched with a maximum tenure of five years of deposits as assets. The banks with traditional collateral -based financing lacked expertise and interest in no or limited recourse project financing to projects. The breaching of sectorial limits for bank lending due to excessive lending to the infrastructure sector and stringent norms of BASEL III also exaggerated the debt financing issue. This lending reached the peak of 9 lac crore out of which 25% turned into NPAs.This resulted into aversion of banks toward lending to the infrastructure sector.

Commercial banks which are the largest source of debt financing are facing problems of asset-liability mismatch, reaching the limit of lending exposure to the infrastructure sector and concentration risk, The corporate bond market is underdeveloped and the lack depth and financial institutions such as insurance and pension funds restrict their investment due to stringent regulations in terms of investment.

To address this issue various Innovative measures of Financing are introduced:

i) Viability gap funding

ii) Infrastructure Debt Funds (IDFs)

iii) Take out financing scheme by IIFCL

iv) India infradebt fund of 50000cr

v) The sources of alternate long term infrastructure financing such as Infrastructure Finance company (IFC), Infrastructure Debt Fund IDF (MF), and Infrastructure Debt Fund IDF (NBFC).

vi) Foreign Institutional investors like Canadian pension fund PSP Investments

vii) Private equity firms such as IDFC Alternative

viii) NBFCs e.g. L & T Financial services

ix) InviT funds

Innovative ways of financing infrastructure

The transaction cost of structuring and procurement of PPP projects is higher in the range of 8 to 10% of the total cost due to the complex structure and a large number of parties involved. The government has introduced instruments such as viability gap funding, Infrastructure debt fund and take out financing by a commercial bank to ease the pressure of higher transaction costs.The government provided grants to socially beneficial but economically weak projects. The projects become economically viable due to various risks affecting the NPV of the projects and inability to raise user charges affecting revenue of the project.

Infrastructure Debt Funds (IDFs) are of two types one similar to mutual funds where the pooling of investment is done for financing infrastructure projects and another type is NBFC such as India Infrastructure Finance Corporation (IIFCL) financing operational projects by raising funds by issuing Indian Rupees and foreign currency denominated bonds and help the infrastructure project SPVs to explore bond market by enhancing their credit by investing initially in such projects to make them investment grade and setting green infrastructure debt funds.

The issue of commercial banks providing long term debt to infrastructure faced with the asset liability mismatch is resolved through Takeout Financing in which the Infrastructure debt funds such as IIFCL offload the debt burden of banks by refinancing debt provided by banks to projects which become operational and facilitate fresh lending by the banks to new infrastructure projects.

Financing by NBFCs and other sources

India infradebt fund with a corpus of 50,000 crores helped the banks by releasing their funds for funding new projects and refinancing the project debt given to infrastructure SPVs.IIFCL (60%), LIC (20%) and IDFC (20%) collectively decided to finance 30,000 crores to infrastructure sector in 2011 which also helped banks to address their asset- liability mismatch issue.

The sources of alternate long term infrastructure financing are Infrastructure Finance company (IFC), Infrastructure Debt Fund IDF (MF), Infrastructure Debt Fund IDF(NBFC) and IIFCL.The active Infrastructure Debt Funds are ILFS Infrastructure Debt Fund, India Infradebt fund (IDF NBFC) having shareholders like ICICI, ICICI home finance, BOB, Citigroup and LIC. IFCI, LIC and IDFC had issued tax free bonds.IIFCL is registered as NBFC-ND-IFC with RBI since Sept 2013.It has authorized capital 5000 INR Cr and paid up capital of 3900 Cr.It's Gross sanction of RS 63800 Cr under direct lending to more than 360 projects.IIFCL has Disbursed 45000 Cr under refinance and takeout financing under direct lending. It has given Take out finance of 11000 Cr for 58 projects. It has done refinancing 6200 Cr till Sept 2015.Infrastructure Finance company in India is SREI IFC ,L& T Infra finance, IRFC , REC, IDFC, IFCI, PFC , PTC India financial services,

PSP Investments fund of Canada build a highway platform named ROADIS by acquiring four operational toll roads in 2016.The Canada Pension Plan Investment Board invested ₹ 2,000 crores in Larsen and Toubro Ltd subsidiary L&T IDPL owning 20 toll road assets.IDFC Alternative, a private equity firm managing India Infra fund IIF I of 930mn$ and India Infra fund IIF II valued 925mn$ investing in infrastructure assets. The investment criterion of the fund is the certainty of cash flow and long term value enhancement, foreseeable and unsurprising capital expenditure and maintenance expenses, projects rendering essential services which are regulated and monopolistic in nature and the absence of risks such as technology risk.

The ten year Tax-free bonds issued by PSUs like Railways, NTPC, NHAI, REC offers attractive investment option to investors due to attractive rates with lower risk, portfolio diversification and tax exemption under section 10 of the Income Tax Act. The government invests receipts from these bonds in infrastructure projects. Most of these bonds with a par value of ₹1,000 trade at a premium in secondary markets.

InviT funds

Infrastructure Investment Trust (InviT) is a new innovative financial product introduced by the capital market regulator SEBI in India. This product has the potential to attract investment from long term investors and foreign investors in capital starved infrastructure sector in India. Due to the short time series data available, a product like InviT is currently under-researched and not popular among investors. Once investors start appreciating the stable cash flow and risk-adjusted financial returns from InviTs every quarter, the instrument will become popular in the domestic markets in near future. The idea of monetising money-generating assets into trusts is expected to provide an exit route to project developers and contractors. Monetization of operational assets through InviT and allows infrastructure developers to reduce their equity stake and get liquidity, which can be invested in new projects and boost investment in the infrastructure sector in India.

Operational Initiatives

1. TOT & HAM models

Toll-Operate-Transfer (TOT) model is developed for the recycling operational highways. The model facilitates long term operation and maintenance of operational National Highways through private sector expertise. The National Highway is allotted on 30 years contract period to a private partners winning in the auction by paying the agreed upfront payment. The operation and Maintenance obligation lie with the concessionaire. The TOT model was initiated by NHAI in 2016 for private developers in the road sector and recycling of operational projects making available funding for new projects.NHAI selected 70 operational road projects to be awarded on TOT basis for 30 years and raised 9500 crores in its first auction of roads of 650 km length. The investors and developers are interested in commercially viable road assets with sustainable revenue.

Hybrid Annuity Model (HAM) model was introduced in Jan 2016. Till December 2017, 52 NH projects with aggregate length of 3200 km involving cost of 51800 Cr were awarded. HAM is mix of EPC and BOT annuity model. Government fund 40% of construction and Balance 60% finance by private players. Annuities are payment for 15 years. HAM mitigates economic risks such inflation, cost overrun and traffic risk. In HAM model, the cost of capital is equivalent to average WACC of the government and private partner which is comparatively lower than WACC of annuity roads. By March 2018 NHAI awarded order worth 75600 Cr under HAM compared with 44000 Cr under BOT and EPC.

During FY19 government was facing challenges in acquiring land for road projects initiated on HAM model.34 out of 100 roads awarded under HAM were stuck, unable to increase the pace of execution as the mobilization advance was not given by government since the appointment date was not announced due to rule of acquiring minimum 80% right of way for a project. Some developer faced the working capital crunch due to delayed payment of mobilization advance by NHAI.The tier two developers could not made financial closure. The challenge in tightness of liquidity has affected these firm's revenue and profitability despite piles of orders. It is observed that Land acquisition is higher in EPC than HAM because NHAI gets additional 150 days buffer on account of time taken by developers for financial closure.

Only 55% HAM projects awarded in 2018 started execution but rest faced issues in land acquisition and cautious lending by the banks. Out of Between 100 awarded HAM projects only 40% could get the lending and rest failed in getting debt within 150 days after award of contract.All nationalized banks' infrastructure related loan books are full or restricted due to either sectorial caps or non-performing loans. Hence though the terms of new HAM models are comforting to the banks, they do not have spare funds to allocate to these hybrid projects .Added to this risk is the inability of the players to secure equity commitment for their projects.60% HAM projects are awarded to listed companies and 40% to non-listed companies. Out of non-listed companies 65% companies have achieved financial closure and rest yet to achieve financial closure.

The contractor needs to arrange first 25% of equity of 60% project cost to get debt from the lender but for debt laden and over leveraged developers it is a challenge to arrange this equity and the only way for them to arrange equity is to sell their operational projects. For HAM structure, the government has to make upfront short term payments of their share of funding and make provisions for long term funding in their annual budgets for next 15 to 20 years which may stress the government financing.

Table 6.3 BOT/EPC/HAM Projects in kms

BOT/EPC/HAM Projects in kms			
	FY16	**FY17**	**FY18**
BOT	873	422	209
EPC	3203	1508	3791
HAM	345	2434	3396

Source: NHAI, MORTH

Table 6.4 Roads Awarded/constructed

Roads Awarded/constructed		
Year	**Roads awarded**	**Road Constructed**
2016	10098	6067
2017	15948	8301
2018	17055	9821

Source: NHAI, MORTH

Table 6.5 HAM projects awards

HAM projects awards				
YEAR	In km	Out of Km	in value cr	Out of Value
2016	345	4365	8300	69700
2017	2434	4337	36300	60900
2018	3396	7396	76500	122000
2019	1750	5000	34990	77750

Source: NHAI, MORTH

Hybrid Annuity Model (HAM) for Road construction

The earlier PPP BOT model the construction, finance and revenue risk was transferred to private developers which they miserably failed to manage leading to disappointing performance of PPP projects. To address this issue the government introduced Hybrid Annuity model in 2016 wherein the government owned revenue risk fully and financing risk partially leaving construction and operation risk with the private developer. The model combines good features of BOT, Annuity and EPC model to attract responsible and serious private partnership in PPP projects.

HAM facilitated developer companies with strong balance sheet to win the project awards keeping away the non-serious and debt laden developers. In 2017 the project awarded on HAM basis were twice in number than EPC projects due to longer stretch and higher budget projects attractive for developers.

Increasing strain on government budgets

In FY18 central plan outlay for the road sector was at INR1.2tn risen 240% over the FY15 figure of INR364bn as shown in table 6.35. This jump has come from a near doubling of budgetary support from the government, highlighting the high emphasis being placed on the roads space but it is increasing strain on government budget.

Finances muscle of NHAI is vital for assessing future project award for road developers. NHAI primarily gets its funds from cess on petrol & diesel, toll revenues and market borrowings. Funds available to NHAI are used for road construction/maintenance, land acquisition, payment of grants, annuities & interest and debt repayment.

6.8 Dispute Resolution Mechanism in PPP

The contract management under MCA is complex. Many times authority encountered conflicting views and interpretations by various stakeholders. This has led to legal disputes claims against authority. There are large number of litigations in highway projects due delay in land acquisition, obtaining various permissions, drawings and designs, diffrences in terms of contract terms. Resolving these litigation will release money blocked in projects to be used in future projects.

B K Chaturvedi committee recommended to classify disputes based on one involved in these projects. The disputes involving money less than 10 Cr categorized as "A" are referred to retired high court judges, CAG, and technical expert's committee and Category B disputes involving money in the range of 10 to 100 Cr is referred to arbitration tribunal. For matters involving more than 100 crore, BKC committee recommended speedy hearing at tribunal and courts and disposal to save interest payments to lenders.

The conflict between private and public are common. Contract should include mechanism to conflict resolution according to fair values. There should be different department to promote and regulate PPP. The creation of permanent, specialized adjudicatory panel is required. The government decided in Sept 2016 to pay 75% of arbitral award to Infrastructure companies. This has helped construction companies to retire their debt and infuse liquidity in ongoing projects.

NHAI is facing arbitration claims of INR 12000 crore in 1100 disputes in tribunals and INR 900 crore in 550 other court cases in EPC projects.INR 9000 of developers are blocked in legal cases. The major disputes occurred due change in design and denial by NHAI to pay added cost to the contractors. Under dispute resolution mechanism, NHAI first approach to the arbitration board and dispute resolution board consisting members from the NHAI and road ministry. If dispute not resolved, the unsatisfied party each to legal court.

6.9 Lackluster response of private parties to PPP projects and shifting from BOT to EPC in Road sector

Since 2005 National Highway Authority of India (NHAI) started awarding highway projects on PPP basis and BOT projects outnumber EPC projects. During 2010 to 2012 competition increased significantly in road sector as it was the only sector where new projects were awarded regularly. With the road segment clocking highest awarding (in terms of volume) amongst all infrastructure segments, the number of players competing for road projects were the highest. This resulted into large number of BOT projects awarded and aggressive bidding by private players.

The road sector which was regarded as PPP success till 2010 had seen a reversal of fortune. Disappointments in traffic growth, balance sheet pressure faced by developers and difficulties in achieving financial closure of BOT projects due to lender's wariness had led to road builders shying away from the BOT mode post FY12.Over INR 16000 Cr projects did not find any

takers in FY 12-13 and 20 road projects worth 27000 Cr totaling 2900km failed to receive any bids in FY 13-14 forcing highway ministry to turn to EPC mode.

BOT projects formed only 15% and 25%, respectively, of the total length of NHAI projects awarded in FY14 and FY15 with majority of the projects being awarded on EPC mode. Cash flow stress in road companies over FY12-14 had led to the EPC mode making a comeback. On 11 Nov 2013 during review of infrastructure sector, Prime Minister led committee allowed the road ministry to pursue EPC model after private firms shunned PPP projects. During FY15, NHAI awarded 21 projects with total length of 2113km of which 18 projects were on EPC mode with length of 1616km and remaining 3 on BOT Toll mode. The daily road length awarded under PPP fell to an all-time low of 0.61 km in FY 14-15 from an all-time high of 17.78 in FY 12.

During FY 15 to FY18 majority of the projects executed in EPC mode and funded by public money collected in the form of higher road cess and government borrowing. MoRTH has overtaken NHAI on the project award front. During FY17, MoRTH project award was 175% higher compared to NHAI and formed 73% of the overall project award. During FY18, the overall road project award was 25,000km, of which NHAI's share was 10,000km with the balance made up by projects awarded by MoRTH. Most projects awarded by MoRTH are small in size (INR2.5-3.0bn) compared to NHAI projects (typically INR 7-8bn). MoRTH projects contribute a much larger share to road construction compared to NHAI projects. In FY17, construction on MoRTH projects was more than double NHAI projects and formed 68% of the 8,200km of projects built during the year.In EPC mode of highway construction government has to bear finance, Operations and maintenance and revenue risk and there is considerable strain on government finances until toll stabilize.

6.10 Debt refinancing/Sponsor's support

I) In case of toll roads, only 21 projects out of 65(32%) are either able to get refinancing of their debt or repaid their debt partially or fully either on their own or due to strong sponsor support.

ii) In case of Annuity roads 12 out of 26 (46%) SPVs manage to refinance their debt or issue corporate bonds/NCDs.

iii) In case of state roads only 4 out 50 roads are able to refinance the project.

6.11 Monetization/Selling of operational projects

i) In case of toll roads 21 projects out of 65 (32%) are sold/monetized by sponsors.

ii) For annuity projects 12 out of 26(46%) are sold by sponsors.

iii) Many Road sector sponsors sold operational road projects to pare /restructure debt under the guidance of the banks concerned as the loans extended by banks to sponsors were on the verge of turning bad and ending up as non-performing assets.

v) Debt laden sponsors sold their operational PPP projects taking advantage of a new government rule that eased the exit of developers of operational road projects to pair their debt.

6.12 Financially weak sponsors

In a sample of road sector, total 66 developers were associated with NHAI and State road development authorities initiated 141 operational, 72 delayed and 28 NHAI terminated projects and 17 State road terminated projects. The prominent bankrupt sponsors with a large portfolio of projects observed were ILFS,Era Infra,Patel Engineering,Ramky Infra andJaypee Infratech.In terms of credit rating ,18 out of 66 sponsors in road sector (27%) have credit rating of A- and Above.18 out 66 (27%) have default credit rating. Rest 29 out of 66(43%) have credit rating in the range of C to BBB+.

6.13 Aggressive Bidding by developers

A private developer offered premium to the government to get the award of the road project in a competitive bidding process if it attractive in terms of financial returns. During boom time a large number of road projects were awarded on premium basis. But after 2012, many projects failed to pay their contracted premium to NHAI and request NHAI to defer the premium payment.

NHAI in Nov 2017 approved deferment of premium for 9 projects (out of 15) worth 5960 Cr spread over next 12 years and postponement of payment of INR 651 Cr in premium to NHAI in 2013-14. The developers can defer payment only if they do not collect enough toll revenue in a year to pay for it after servicing the debt and OM cost. Developers need to pay 11% interest on premium. The developers can not declare dividend till payment of contracted payment. The developer have to share toll collection data on real time basis to get benefit of premium deferment by NHAI.

According to NHAI the deferment value is as per current estimate and may change if economy improves resulting into higher toll collections. Premium recast has been proposed by Rangrajan committee. The deferment is a great comfort to lenders as their debt obligation would get priority over the premium payable to NHAI.The premium deferent scheme is introduced to give relief to stressed highway projects due to challenging economic condition and NHAI will recover the premium with interest after revival of economy. The deferment amount is equivalent to the shortfall in revenue after operational expenses and interest on debt payment.

Model of Competitive Bidding for toll roads is adopted by NHAI to achieve lower tariff based on technical, operational and financial efficiencies due to competition. The bidders perform due diligence before quoting bid which creates fair competition. The return in the project and hence bidding quote depends on factors such as demand projections, location of project, and economic scenario of country and market dynamics. But some bidders have overestimated their efficiencies and under estimate their costs and quoted lower traffic. Such bidder incur loss and face difficulty in repaying the loans. In a sample of 21 projects awarded on premium basis almost all road projects showing negative EIRR and very few positive PIR which clearly indicated aggressive bidding without adequate due diligence from concessionaires.

6.14 Regulatory Aspects of PPP

i) The road sector has no regulator. The airport and seaport sector has multiple sectors with overlapping in their power and decisions are generally taken at arm's length. The municipal sector also lacks regulatory framework.

iii) The government authorities lack capacity to deal with new corporate partners as against traditional government setup leading to regulatory uncertainty.

iv) In road sector NHAI and state level authorities acting as implementation agency as well as rule making authority creating conflict of interest. The sector requires an independent regulator to deal with issues such as contractual conflicts, financial stress, legal issues, tariff setting, service quality, monitoring contracts and regulate implementing agencies.

v) In sea port sector frequent revisions in rules of tariff setting has created discriminating treatment for projects of same nature implemented at different time frames creating uncertainty in the minds of developers for bidding. The demarcation of CRZ area is critical issue in the seaport sector in terms of getting environmental clearances

There is an urgent need to focus on strengthening the systems to speed up the overall environmental clearance process in general and in particular for the port sector by increasing manpower, infrastructure and competencies with statutory authorities at the state and central level. More institutions are required to be given authorization for conducting CRZ demarcation.

vi) For Airports sectors, critical issues in terms of regulation are use of lad for non-airport activities, ROE, cargo operation, fuel supply and ground facilities. The sector requires a single regulator who can take care of tariff control and operations and safety.

vii) The regulatory framework of various infrastructure sectors are set up with adequate coordination and in ad-hoc manner affecting efficiency and productivity of the sectors due to fragmented regulation.

6.15 Measures taken by government

1. For land acquisition and environmental issues

i. The state government and railway ministry deputed special officers to resolve land acquisition and various clearance issues.

ii. MORTH has been empowered to issue notification for acquisition of land for national highways without consulting the ministry of law.

iii. The PPP highways projects relieved from obtaining right of way from forest and environment department up to 60 meter width from the road.

iv. A uniform policy about environmental clearance is suggested to the environment ministry.

v. The government made it mandatory to award PPP project only after acquiring minimum 80% of required land for the project.

vi. NHAI deputed manager for effective coordination with the states for land acquisition issues.

vii. To fast track land acquisition the government is offering incentives like sharing of project cost as reward to state government doing timely land acquisition.

viii. The forest clearance process is simplified by converting two stage procedure to one stage. The environmental clearance is not needed for road projects less than 100km length.

2. To address the malpractice of hoarding of projects by aggressive bidding by the developers, the government incorporated amendments in RFP and RFQ documents in procurement process.

3. The B.K. Chaturvedi made its recommendations for resolving disputes in highway sector and about financing and MCA aspects of the sector. Based on committee's suggestion the empowered group of ministers took decision of executing 60 % project on Toll basis, 25% on Annuity and rest on EPC basis.In 2011, 30 non - performing and defaulter road were banned by NHAI. NHAI settled claims worth INR 2000 crore in the highway projects.

4. The authority has made the policy to seek consultancy services from experts in field of finance, technology, legal to enhance efficiency of the sector.

5. The government framed rules to collect toll on national highway in 2018.To improve the toll collection process appointed toll collection selected through competitive bidding process.

6. Government provide capital grant of 40% of total project cost to make projects financially attractive.The tax exemption is provided for project SPVs for ten years.

7. Total 73 projects of 8187 km length worth estimated investment of INR 1 lac crore were identified as languishing projects.

8. Policy intervention by the government

i. NHAI avail the working capital finance under one time fund infusion scheme.

ii. The annuity is given in advance to put delayed annuity projects on track.

iii. NHAI has cancelled projects which could not take off and restructured premium payment of stressed projects.NHAI also proposed to fund 30% of project cost of stressed project subject to first right of refusal on toll revenue.

iv. Extension of concession period

v. Termination and substitution of concessionaire.

vi. Total 48 Projects worth 5090 Cr were terminated, repacked and rebid,15 Projects worth 2054 crore were resolved through regular monitoring and 10 Projects worth 1041 crore were reviewed after policy interventions.

vii. Ministry of Road Transport and Highways (MoRTH) in March 2019 declared policy for resolution of stuck projects which provides parameters for NHAI to foreclose the concession agreement and pay compensation in arbitration cases.

9. In March 2013 RBI allowed borrowers to treat the debt of infrastructure projects set up under public-private partnerships (PPPs) as secured. Under the PPP model the asset is owned by the government but constructed by private developer. The debt is serviced through the future revenues earned by the developer from tolls or other kinds of user charges once the infrastructure goes into operation. The lender has collateral of concession agreement under project finance structure.In 2010, RBI eased norms for projects financed by annuities, in which the government itself paid the developer an annual fee to cover operating costs, along with a margin for the developer.RBI allowed the assets of PPP projects and MCA including toll roads with revenue uncertainty as security for debt giving comfort to the lender banks.

The RBI ordered to deposit toll revenue in escrow account giving priority to lender on it. Further, if toll revenues were less than anticipated, provision were there were to increase the user charges and extend the contract tenure. The lenders had a step in right to replace the bankrupt or defaulting developer. These provisions eased the liquidity and facilitated lenders to fund more infrastructure projects. Under RBI norms, all banks have to write off specified amounts of loans that have turned 'bad' and where borrowers have defaulted on interest payments. In this scheme only 20% of the secured loan to project SPV is written off as compared to 100% in case of unsecured loans. This increases the commercial ability to finance five times more to infrastructure sector. The exposure to infrastructure for Indian banks was around INR 7 lac crore, or 15% of all loans as of December 2012.

10. National Highways Authority of India (NHAI) has decided to mop up INR 51 billion by monetizing operational highway projects through Infrastructure Investment Trust (InvIT) in September 2021 which will be used to repay dent and fund new projects.

6.16 Impact of Covid -19 Pandemic on India PPPs

The Impact on PPP projects

a) The weak economic activity, due to the Covid-19 pandemic in March 2020 and the subsequent stringed lockdown severely impacted the PPP projects financially especially transportation projects in the road and port sectors.

b) Even PPPs that receive revenue through the availability of payments suffered in the long term, as the government faces a shrinking economy that resulted in declining tax revenues and reduced budgetary allocations to honor the existing commitments to the contracts.

c) Adani Group who won an award to develop seven domestic airports delayed the construction work

d) The sharp drop in passengers for airports affected PPP airports in India to the tune of INR 50 billion

e) NHAI postponed its decision to launch InviT Scheme

Lessons from the Covid-19 Pandemic

a) The force majeure risk such as the pandemic was not anicipated and incorporated in PPP contracts bearing revenue risk.

b) Sustainable and resilient PPPs need to be developed in the future.

c) COVID-19 has affected both types of projects in place and in planning. The demand disruptions yielded revenue losses for PPP construction is affected and future planning is extremely challenging.

d) The awarded PPP projects are facing challenges in terms of financial closure.

e) Projects sponsored by foreign entities were severely affected due to the nonavailability of foreign engineers.

f) The migration of labourers impacted the construction sites.

g) Many tendes were cancelled due to lower demand projections. And the government transferred the funds to handle COVID-19 situations.

h) Projects in the pipeline and under construction are required to be re-reviewed often in the crisis environment and operational projects are to be reexamined for contractual obligations.

i) Healthy cooperation with the private sector is more important than ever as the government is even more fiscally constrained.

j) The clauses in concession such as Force majeure, compensation, and change-in-law to be considered on case to case basis to mitigate the financial impact on the projects and made them viable.

k) The government safeguards the critical infrastructure services

l) The policy measures such as financial restructuring, and imparting liquidity, credit risk enhancement and monetization of operations assets.

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Chapter 7

Conclusions, Suggestions and Recommendations

Chapter 7

Conclusions, Suggestions .and Recommendations

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7.1 The Conclusions based on quantitative and qualitative analysis of delayed, stalled, and Terminated Projects.

The study analysed 150 delayed and stalled under- construction and terminated PPP projects corroborated by five case studies and derived the following conclusions:

Concluion 1. Failure in terms of Land Acquisition and Resettlement and obtaining Environmental and forest clearance delayed, and stalled projects

The biggest problem in Infrastructure projects was not getting land for the project due to various land Acquisition and Resettlement issues which delayed and stalled a large number of projects. In the case of central projects, the state authorities had not cooperated proactively to make available land or resolved land- related issues. Land acquisition had been a chronic problem in road projects, some of which never took off.The land acquisition for infrastructure projects is a long drawn out cumbersome process in India. India is an agriculture country where more than 70% of people are involved in agricultural activities for livelihood. For Indian farmers, their fertile land is the most precious resource and hence they are always reluctant to offer their land for infrastructure projects.

As per the new land acquisition Act, the compensation is calculated as market price plus 100% in the urban areas and 400% in rural areas plus damages if done to standing crops. That increases the project cost inadvertently. The PPP infrastructure projects require large land acquisition resulting in a large scale displacement of people and destruction of the natural environment and hence face challenges in getting land and environment clearance for such projects.

The EIA report was assessed by the central EAC or State EAC, depending on the category of the project, and deciding whether to accept or reject the project. The project managers failed to submit environmental compliance reports during various phases of the project resulting in the imposition of the penalty by the regulator and termination in case of extreme violations.

Conclusion 2. Financially weak sponsors

In a sample of the road sector, total of 66 developers associated with NHAI and State road development authorities initiated 141 operational, 72 delayed and 28 NHAI terminated projects and 17 State road terminated projects. The prominent bankrupt sponsors with a large portfolio of projects observed were ILFS, Era Infra, Patel Engineering, Ramky Infra and Jaypee Infratech. In terms of credit rating ,18 out of 66 sponsors in road sector (27%) have credit rating of A- and Above.18 out 66 (27%) have default credit rating. Rest 29 out of 66(43%) have credit rating in the range of C to BBB+. These sponsors could not arrange the equity during the financial closure and could not support project SPVs during construction phase. Such projects got delayed, stalled and terminated.

Conclusion 3. **The contractual disputes between the developer and authority**

The parties with conflicting interests participated in the PPP projects. The absence of information sharing and the disguising of the private data made the projects prone to uncertainty and information asymmetry. Due to the deficient project monitoring and absence of information, the project authorities failed to resolve the issues that cropped up during the construction phases such as a change in design, and scope and during the operation phase such as revenue sharing and renegotiations. In many projects e.g. New Mumbai airport and Chennai port expressway projects, the project authorities could not oblige contractual obligations of arranging land, licenses and environmental permissions on time resulting in legal disputes.

Conclusion 4. Failure in connecting contractual performance norms with payment mechanisms resulted in ineffective contractual monitoring by the authorities

Sufficient enforceable performance measures were observed to be absent in the concession agreements of many projects. The failure in stringent monitoring norms tied up with the quantifiable performance of the private partner and the delay in resolving issues resulted in time and cost overrun and degraded quality.

7.2 The Conclusions based on quantitative and qualitative analysis of completed Operational PPP projects

Based on the quantitative analysis of a sample of 170 operational PPP projects corroborated by qualitative analysis of five case studies of financially successful and financially failed operational PPP projects, we have derived the following conclusions.

Conclusion 1: The dismal returns on equity of the ongoing operational PPP projects discouraged the private sector in India to invest in future PPP projects.

The analysis of operational projects using the hypothetical financial model suggests that 77% of the projects have positive project IRR andthr remaining projects have negative project IRR. But, only 38% of projects achieve positive equity IRR. This implies that only one out of three PPP projects give any return to equity holders of the projects. This is a probable reason why the interest of developers has waned in PPP projects after 2012 in India.

Conclusion 2: T**ime and cost overruns of PPP projects are the biggest risk faced by PPP projects resulting in the depression of EIRR.**

Very high time and cost overrun was observed in the PPP projects. The prime reasons for the time and cost overrun had been the non availability of land, difficulty in getting right of way, environment clearances, forest land clearances and other government permissions required from local governments. Other issues which have delayed projects are legal disputes, rehabilitation and resettlement issues, shifting of utilities, changes in government policy, delay in getting financial closure, weak financial positions of sponsors, inadequate due diligence by concessionaire during the bidding stage, lack of coordination and trust between concessionaire and government authority, and differences between central and state governments. These projects were not sufficiently ready at the time of bidding hinting at insufficient planning.

Conclusion 3: Inappropriate allocation and transfer of risk to private developers

The basis of achieving efficiency gains and value for money of a PPP project is to pass on the risk to the party which can handle it best. It was the contractual obligation of the authorities to make the availability of land and ROW for the contractor. But failure of authority to acquire the land resulted into time and cost overrun leading to increase in interest during construction. And subsequently the projects become economically and financially unviable. The private developers sector assumed much of predevelopment phase risk such as clearances, land acquisition and so on leading to cost overrun. Ideally these risks are better managed by public authorities. The findings of this study suggest that the risks are more skewed toward private developers. There is a need for requisite revisions in the risk sharing pattern between the government and the private investor for future PPP projects.

Conclusion 4: The projects successful in refinancing their debt observed to capture positive Equity IRR.

Out of 170 operational projects only 30 projects (17.75%) could manage to refinance their debt through refinancing of bank loans or raising bonds/NCDs while rest projects failed to do so due to their own weak balance sheets and credit profile and that of their sponsors. Out of these 30 projects 12 road projects (40%) are annuity based projects receiving annuity from NHAI and were able to raise NCDs due highest rating of NHAI(AAA) and surety of getting annuity from NHAI eliminating revenue or demand risk. In the absence of a vibrant takeout market, refinancing of projects did not take place at the desired scale and pace. Underdeveloped debt markets have been a cause for concern in raising bonds for PPP projects.

The duration of a concession captures cash flow characteristics and peculiar financing of PPP projects based on bank loans with reset clause. If duration of a project is long, it gives equity providers to refinance projects at a lower rate and lenders are ready to do so as construction and completion risks are fully mitigated for operational projects. The debt refinancing provides benefits in terms of enhanced credit ratings and market liquidity for infrastructure projects, extension in repayment schedule. It is observed that the refinancing was possible for projects where the sponsor provided corporate guarantee and in case where the financially strong sponsors like L&T & Sadbhav Infrastructure provided financial support towards meeting any deficits in servicing of its debt obligations as well as the premium payable to NHAI through subordinate debts or letter of comfort towards assistance in meeting debt service obligations and Debt Service Reserve Account.

Conclusion 5: Financial returns of Annuity projects were better than toll/fee based PPP projects indicating significant revenue risk for toll/fee based projects due to lower than expected revenue during operation phase leading to disappointing Equity IRR.

For a sample of 170 operational projects, the financial performance of toll/fee based projects where revenue is collected from end users is observed to be very disappointing. Out of 65 toll road projects in our sample, only 41 (63%) projects have earned positive returns (PIRR) and only 16(25%) projects have earned positive returns for concessionaires (EIRR).The annuity roads have done comparatively fairly with positive EIRR for 12 projects out of 26(46%) projects and positive returns to project (PIRR) in 26 out of 26 cases (100%).

Table 7.1: Comparison of NHAI Toll and annuity Projects

Comparison of NHAI Toll and Annuity Projects		
Parameter	Toll Road Projects	Annuity based Projects
Number of projects	65	26
Average NPV (INR Cr)	-671.04	-346.16
Average Project IRR	6.39%	10.15%
Average Equity IRR	-0.74%	8.54%
Source : Author's Calculation		

The annuity projects assures the certainty of cash flow and comfort to the lenders to lend to such projects.For annuity projects, the downward risk is capped whereas for toll based road projects, both the risk and benefits are unlimited.In case of toll/fee based projects, the private partner accept the demand risk in toll projects not available in the annuity projects. The private developers bid for toll based PPPs if they forsee an attractive risk reward equation and expect higher benefit with higher risk than the moderate one.

In toll based project, the developer constructs the infrastructure road and is recover his investment through fee collection for the contract duration from end users.But it is observed that the revenue during the operation phase was less as compared to that anticipated during start of the project even failure in servicing the debt.Economically, the per unit cost is less in toll based projects due to larger size of the infrastructure and economies of the scale.In case of the toll based projects, the revenues varies with the ups and downs in the macro economy.The seasonal traffic, alternative roads and maintenance are also seriouss issue in toll projects.

Conclusion 6: The PPP projects awarded on premium/negative grant basis earned negative returns which indicates aggressive bidding by developers

A premium or negative grant is the amount offered by a developer to the government to bag the road project. The developers bid for projects on a premium if they find it lucrative and they are confident that the toll/fee revenue accruing to them would be more than their total cost. During the boom time pre 2012, a large number of road projects were awarded on premium basis but post 2012 many projects failed to pay their contracted premium to NHAI and request NHAI to defer the premium payment. The obligation to pay premium as per contract terms severely affected the debt obligation of developers and created liquidity problem.

The model of competitive bidding for the toll roads was adopted by NHAI to achieve lower tariff based on technical, operational and financial efficiencies brought about through competition. It was expected that bidders would estimate their cost and efficiencies and will act rationally while quoting tariff so as to have a fair competition. The return in the project and hence bidding quote depends on factors such as demand projections, location of project, and macroeconomic scenario of country and market dynamics. But some developers overestimated their efficiencies and under estimated their costs and quoted lower traffic. Such developers incurred loss and faced difficulty in repaying the debt. In a sample of 21 road projects awarded on premium basis almost all road projects earned negative EIRR suggesting aggressive bidding without adequate due diligence from the concessionaires.

The comparative analysis of projects receiving government grant and projects awarded on premium (negative grant) reveals that projects receiving government grant could manage risk while awarded on premium basis failed in managing the risk. The capital grant was provided for projects which were economically justified but financially not viable. Our analysis shows that the capital grant has significantly improve the financial viability of projects while the projects awarded on premium basis had done miserably. These project SPVs subsequently requested for deferment of premium to road development authority NHAI.

Many Sponsors sold their stakes in the operational Build-Operate-Transfer (BOT) assets. The road developers which initially focused on the projects that required them to invest heavily and bear major risks over long periods had later shifted focus to an asset-light EPC model as BOT model burdened them with heavy debt. The developers later realized that their strength is not in operating and maintaining an asset, but in building an asset.

Conclusion 7: The failure in risk management was responsible for the overall dismal financial performance of the Operational projects

i) Construction, Time and Cost overrun Risk

A project's inability to acquire all statutory clearances prior to the commencement of construction activity resulted in construction risk and delay in completion of the projects. In case of cost overrun, the private developer has to arrange the additional funds which severely impacted financial returns of the developer and discourage them to participate in future projects.

ii) Revenue Risk

The significant risk noticed in case of a large numbers of the failed projects was lower-than-anticipated traffic growth during operations and in turn subdued toll/fee collections during operation phase.The irrational traffic estimations during the pre-bid phase were seed of this disaster. It is essential to be realistic in assessing the market risk of a project as traffic projection is the key input in projecting tariff during operation hase and it is directly linked to the revenues against which project cost and final returns are decided. In the absence of robust project preparation, many projects observed to face revenue risk. A proper attention was not given to the projection of traffic volume.

iii) **Financially weak Sponsor risk**

A better financial strength of the sponsor is significant at the time of financial closure and construction phase when cost of the projects increases than the planned one. The financially weak sponsor failed in supporting the project when it needs it. The financial competancy of sponsor construction companies having a large portfolios of PPP projects became highly stressed. As a result, they failed in funding the mismatched cash flow and equity during construction due to cost overrun and during operational phase when the revenue of SPVs was insufficient even to carry out major maintenance work as in case of Dindigul expressway and Mumbai Metro rail project.

iv) Legal dispute risk

PPP contract are basically incomplete contract where provision for dealing with all the contingencies in all the states of the world cannot be included. When the emergency occurs which is not defined in the contract, the question arises who and how will deal with that issue and who will bear the cost of managing the issue. Since there was no provision in the PPP contracts for renegotiation and due to fear of blame of a moral hazard, nobody including contract management team took the decision to deal with the issues. This resulted into delay of

the projects, cost overrun and ultimately financial failure of the projects. The cause of the termination for cases like PNG Toll way and L&T Halol state road project was the unresolved dispute between the government and the developer.

v) Regulatory risk

An independent regulator is required in the sector to balance the interests of both the public authority and the comcessionaire. There is no such independent regulator for Highway road sector which results into disputes, arbitration and court cases between NHAI which is implementation agency and the private concessionaires. As a result NHAI did not receive response for its proposed PPP road projects from the private developers in 2020. As observed in case of Mumbai Airport project, the private operators must be regulated in terms of tariff and other charges to safeguard the stakeholders like passengers and airlines.

Conclusion 8: The lackluster response of developers post 2012 due to disappointment by the projects

As a result of the disappointing performance of PPP projects, private developers who earlier enthusiastically participated in the PPP program of building the much needed infrastructure in India stayed away from it and PPP model in India come to standstill. The study conclude that there is a positive corelation between operationally and financially successful PPP projects and their efficient contract and risk management as PPP contracts are inherently incomplete due to long time span. And uncertainty involved.

Conclusion 9: The Credit worthiness of PPP sponsor significanty affect the outcome of PPP project

With the Regression Analysis using "Credit worthiness of sponsor" as a moderator variable the study conclude that the Credit Worthiness of the Project Sponsor (Private Partner) does moderate the relationship between PIRR and EIRR significantly statistically.The technical competency of the project sponsor ensure operational efficiency and complete the project on time and within budget. The financially strong sponsor such as L& T and IRB can help its project subsidiary during financial closure and during liquidity issues during operation of the project.

7.3 Conclusions based on Infrastructure subsectors Analysis

Each infrastructure sector has its own set of characteristics, rules, and regulations and economic considerations. Every project is unique in terms of its characteristics.

A) Road Sector: India has implemented one of the largest PPP programs in the world. The national highway road projects by NHAI on a toll/ equity basis and state toads by various state road authorities are studied in this research. The financial performance of the road sector was disappointing. Various issues observed were time and cost overrun, delaying, stalling and terminations of the road projects, bankrupt project sponsors, aggressive bidding by sponsor's , contractual issues like terminations and court cases have been observed in this sector. The newly developed HAM model by NHAI in the road sector could not resolve these issues.

B) Seaport Sector: The sector failed to attract foreign investor due to rigid concessions, not being lexible to respond to international market dynamics such as minimum guaranteed cargo (MCG) and issues in contract and regulation of the sector. The changes in MCA are not giving due consideration to existing concessions. An efficient grievance and dispute resolution mechanism and optimum allocation of risk between the partners are needed in the sector.

C) Airports: This sector had observed fair financial performance by airports developed in major cities in India and there is a sizable increase in the demand. But the sector has faced various contractual and regulatory issues such as a conflict between authority and concessionaire on the issue of income recognition and sharing of the revenue.

D) Metro rail: All three projects faced cost and time overruns and stressed balance sheet of the sponsors.

E) UMPP: An increase in international coal prices made both the operational UMPP projects economically unviable.

F) Hydro PPP projects: Almost all of the projects could not even start up due to environmental and forest clearance issues. Those few completed faced problem of a drastic fall in revenues due to a fall in merchant power prices.

7.4 Overall conclusion

The government of India set up a PPP framework in India and by 2011, India was the second largest country in the world in terms of initiating PPP projects. After 2011, the number of PPP projects started declining due to lackluster responses from the developers. The prime focus of the PPP program in India was getting efficiency gains and capital from the private players. But the preference was given to bidders offering the lowest bid or the largest premium rather than sustainable operations during the concession period.

The failure to incorporate policies to mitigate various issues during the design, construction, and operational phase in the PPP contract, poor contract management, and lack of dispute redresser mechanism, regulatory issues, inefficient and inequitable allocation of risk among partners, unbalanced contract design and inefficient execution of contract leads to failure of PPP model In India. The performance of the PPP structure in the Infrastructure sector in India in terms of Contract Management was disappointing mainly due to weak legal, policy, and regulatory framework.

The PPP program in India was moderately successful in achieving the desired objectives and narrowing the infrastructure gap. The benefits would have been even more substantial if the PPP program had been better planned and executed and some undesirable effects would have been averted. For the next generation of PPP projects, these lessons need to be examined and the suggestions to be incorporated.

Forming balanced contracts with an equitable and optimum allocation of risk between the partners, incorporating flexibility to address changing macroeconomic and market conditions and enforcement of contract through a competent institutional, contractual and legal framework

, addressing issues of moral hazard, adverse selection and opportunism and creating adequate risk- adjusted financial returns to the private partner and Value for money for the government will make future PPP successful creating a world- class infrastructure in India enhancing the quality of life of the people.

7.5 Suggestions & Recommendations

1. It is suggested that every project should be technically viable and economically feasible confirmed so by the external consultant who should prepare DPR, a foundation of a sound project, by actually visiting the site. The project preparation can be improved by consulting an external consultant, gathering maximum information and creating differentiated solutions for different phases of the project. A good DPR enables the government to establish a range of fair bids making the project viable eliminating non-serious bidders.Inadequately prepared project not only lead to irrational bidding, but they also are potential candidates for mid-stream changes and disputes.

3. The concessions need to be redrafted considering changing market conditions, and technologies, the risk profile of assets, investor's expectations and bankability of the project. An objective and time- bound procurement process and creation of a new sources for long-term finances are also required.

4. To check the aggressive, a "**Rule of Three**" should be used whereby no bidder should be allowed to bid for more than three projects pending financial closure. A two- stage procedure using a surety bonds should be used to ensure the seriousness of bidders. The bids should be evaluated through a rational and objective screening process.

5. To make projects "plug and play" ready, the required land, right of way, and environment and forest clearance must be acquired before starting the bidding process. The process of getting permissions from third parties such as the railway and local Municipal Corporation should be strictly time- bound.

6. Every bid received should be rigorously evaluated in terms of assumptions about the treatment of risk and measures to enhance efficiency through stringent and transparent evaluation baseline criteria to differentiate between diligent and speculative bidders discouraging aggressive bidding and hoarding of the projects. A range of bids making projects viable should be established and bids falling out of this range should be rejected. The bids underwritten by lenders with realistic revenue and expenses should be given preference. A surety bond should be taken from bidders qualified in the first technical stage of bidding to ensure their seriousness. In the second financial evaluation stage, the firm offering the lowest toll or lowest present value of revenue (PVR) should be selected.

7. For effective contract management, vigilant monitoring and control processes to prohibit contractual noncompliance to ensure effective service delivery and cordial relationship.

8. All possible information about the project should be collected to avoid any subsequent moral hazard and renegotiations due to asymmetry of information. The financially and technically

incompetent developers should be kept away from the bidding process to avoid waste of time. The Surety bonds can be used at different stages of the process to select only serious developers.

9. The specialized regulator prevents frequent and unjustifiable renegotiations and post facto damaging modifications by dealing with contingencies by doing appropriate changes in the current regulatory framework and improving the quality of enforcement of contracts.

10. Risk Mitigation Strategies

The risk assessment and mitigation strategies should be worked out in tandem to reduce financing costs.

Table 7.2 Risk Mitigation Strategies for PPPs

Risk Mitigation Strategies for PPPs		
Sr. No.	**Type of Risk**	**Risk Mitigation Strategy**
1	Time overrun risk	The ready project in terms of site and environment and other required permissions & appointing a technically competent and financially sound experienced contractor
2	Supply risk	Assured sources of supply and provision for liquidated damage in the contract
3	Technology risk in terms of new and untested technology	PPP tender should mention clear and appropriate technical standards and design specifications of the PPP
4	Operating risks such as increased cost of operation, lower capacity inefficient operation	Established and tested technology with a guarantee from the manufacturer, correct output specification/ lender's engineer report/ / provision for maintenance reserve/Environment sustainability measures
5	The demand/revenue risk of insufficient demand and/or revenue (due to low demand, leakage, competing facilities, capacity, price setting, augmentation	Realistic demand studies, sensitivity analysis/Regular monitoring/Contractual framework/ Price indexation/ Long term offtake contracts
6	Change in tax rates	Doing the sensitivity analysis to ensure adequate financial returns under adversity
7	Sponsor risk	Doing the sensitivity analysis in case of major policy changes by the government
8	Force Majeure/Natural events such as floods and earthquakes severely impact project operations	Estimation of risks due to Force Majeure/Natural events at the project location and plan in terms of withstanding the negative impact on project assets and cash flow

9	Political events (Major amendment in law, expropriation by the government, cancellation of permissions, termination of contract by the authority)	Availing Multilateral Investment Guarantee Agency, contractual provisions for dispute resolution and fair compensation and clear terms for the termination in the concession agreement

7.6 Limitations

Some limitations of the study are:

1. Knowing that literature identifies various aspects of PPP, this study is limited in its scope by considering the financial performance, risk, and contract management of Indian PPP projects.

2. Data is not available in the public domain for operational projects completed by unlisted promoters which restricts the sample size of operational projects.

7.7 Contribution / Value of the Research

This study has explored various contract and risk management aspects of PPP in the institutional, legal, and regulatory setup of PPPs.The study explored the challenges faced by the PPP model in India. The study investigated how the the PPP model evolved in India and its present state.

This study presents the analysis of large numbers of PPP projects in India creating a great opportunity to learn from the wealth of experience of PPPs accumulated over the past two decades. The findings of this research help understand the lackluster response of private players to PPP in past few years and the issues in institutional, legal and regulatory setup resulting in delayed and terminated projects which resulted in the inability to create infrastructure capacity. The study has covered almost all subsectors of infrastructure like road, seaport, airport, metro, power project, and healthcare projects.

7.8 Theoretical Implications

The incomplete Contract Theory

In the case of complete contracts, anything that can happen in the future is provided for in the contract. The two partners generate a surplus individually as well as jointly through economic cooperation. But there is also scope for opportunistic behavior to maximize individual gains rather than the combined surplus. Hart (2017) explained that actual contracts are poorly drafted, and miss out on critical aspects hence they are incomplete.

When the parties fail to set out the detailed contract in advance for all contingencies, it becomes an incomplete contract. Such a contract results in opportunistic behavior such as holding up by the partners. In such cases, the partner with more bargaining power due to residual rights gets more benefits during the renegotiation of the contract which kills the incentive of another partner to invest in the project which is detrimental to the partnerships.

The PPP contracts of long tenures lead to contractual incompleteness as highlighted in the economic literature on incomplete contracts. If the institutions are weak in handling disputes arising in incomplete contracts and the third party such as a court can not verify the contractual terms, the party with the residual control rights gets a higher share of the benefit during the renegotiation of the contract. (Hart, 2017).

Both the theoretical and empirical literature on PPP has revealed problems with incomplete contracts such as repeated renegotiations, ineffective contract and risk management, information asymmetry, breach of contracts, disputes between the partners, and failure to meet the objectives.

The Transaction cost theory

The theory of incomplete contracts is built on and formalizes the intuitions of transaction costs theory (Salanié, 2005). The incomplete contract literature is a formalized version of the fundamental aspects of the transaction costs theory. (Vahabi, 2002)As per in transaction costs theory, the asset specificity introduces asymmetry of information between the parties.

Property Rights Theory

The various aspects of incomplete contracts and the residual control rights form the basis for the property rights theory, which is complemented by the transaction cost theory. In the property rights approach, "firm" is synonymous with assets; and "ownership" is synonymous to residual control rights over those assets.

The incomplete contracts theory and property rights theory helped in explaining issues such as state and private property disputes, quality-cost trade-offs in public procurement, and deciding if the project is to be done on a traditional procurement basis or in public-private partnerships mode. The cost of writing a contingent contract without gaps or ambiguities is very high. The frequent renegotiations are the predicament in PPP contracts that adversely affect the competition as the contractor expert in bidding aggressively while assuming ex-post renegotiation wins the contract against the most efficient and eligible contractor. The property rights theory proposes various solutions to deal with issues involved in the renegotiation of concession agreements such as pre-designed renegotiation mechanisms, penalties, flexible contracts .and investment structures.

The PPP literature suggested addressing contractual incompleteness by not formulating more complete ,and contracts, but forming a new generation of contracts offering better protections, based on institutional frameworks and governance, efficient monitoring ,and dispute resolution mechanism, interpretation, contract enforcement and efficient risk allocation among the partners. The contracts should be flexible in terms of structures and closely tied to the measurement and monitoring the performance and quality. The PPP contract should be designed with the proper design of incentives.

The major findings

1) The project cost of PPP projects is 207.75 % higher than traditional procurement projects.

2) A large number of projects were delayed, stalled, and terminated due to nonperformance of the contract by the partners.

2) Only 38% of projects have given positive returns to equity investors/ private concessionaires which was the major cause of lackluster response for future PPP projects from the developers.

3) Various contractual disputes between the parties observed in terms of change in design and scope of the project, revenue sharing, failure in maintenance by the developer, nonreceipt of grant/annuity from the the government.

4) The study observed various issues in institutional governance, contract management, and risk management which are key to the success of the PPP model of building sustainable public infrastructure.

5) The PPP contracts were observed to be rigid and lack provision to change as per market conditions. There were no provisions in PPP concessions to handle uncertainties and risk during operations. There was inequitable risk allocation among different stakeholders.

6) The parties were in dispute or unanticipated events led to recourse to traditional long drawn -out legal systems for resolution.

7) A key issue in the context of a budget overrun was the identification of who should pay for the construction budget overrun as it was not written in the contracts.

The linkage of the findings of the study with the theory

1) The outcome of the analysis of delayed, stalled, terminated ,and financially failed operational projects are in conformance with the theory of incomplete contracts depicting that opportunistic behaviour of parties involved with the incomplete contracts result in higher transaction costs, deficient investment, holdup issues ,and contract renegotiations.

2) The study has observed that many bidders submitted overly aggressive bids to ensure selection, with the aim of subsequently renegotiating the contract. Such projects failed in terms of financial closure, inefficient and delayed construction work, and dismal financial results in the case of operational projects due to inadequate revenue during operations.

3) As perthe theory, the residual control rights are significantly important in incomplete contracts in deciding the bargaining power and incentives to act and the results of the study suggested that many developers exploited them to save resources which resulted in quality impairment, suboptimal investments, and renegotiations.

4) The finding of the study suggests that, in projects where the service quality was not specified explicitly in a contract, the developer operated at the lowest possible cost, lowering quality even if the letter of the contract was not breached.

8) A strong and clearly defined institutional framework and efficient regulations in sectors such as power transmission and airports have successfully managed the issues associated with incomplete contracts and delivered financially successful PPP projects whereas the national highway and state road sector with a higher number and percentage of overall PPP projects were not having any regulator resulting into several court cases and stalled projects. The study has critically analysed the PPP model in India in the last two decades drawing on the theoretical basis of incomplete contract theory, property rights theory, and transaction cost theory. The results of the study relate and agree with the scholarly work surveyed in the literature review. The findings of this study are in conformance with the incomplete contract theory, property rights theory and transaction cost theory and strongly recommend that policymakers to pay close attention to the incompleteness of contracts while designing next -generation PPP projects.

7.9 Practical and Policy Implications

The research outputs of the study would inform policymakers and private developers on the appropriate measures to adopt when engaging in future PPP projects and implementing bankable and sustainable PPP projects.

7.10 Scope of Future Research

This extensive study has brought out very interesting outcomes and also identified some of the opportunities that emerge to be taken up for further research in this area.

1. A detailed study of HAM & TOT based PPP projects can be done in the future.

2. Study of PPP airports in tier -two cities.

3. Exploration of PPP model smart city, Railway, and healthcare projects.

4. Exploration of the PPP model in India post Covid-19 pandemic.

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Appendices

Appendix A – The data of terminated/cancelled PPP Projects in India

Terminated NHAI PPP Projects				
Sr. No	**Project Description**	**Terminated by**	**Issue**	**Category of Issue**
1	AbhijitHazaribagh Tollroad	Government	Financial issues of sponsor (FIOS)	Financially weak sponsor(FWS)
2	BadarpurFaridabad Tollways	Concessionaire	Traffic reduced due to supreme courts ban on vehicles	Force Majeure Event (FME)
3	BarasatKrishnanagar Expressway	Concessionaire	Non availability of land and ROW(NALROW)	Land Acquisition Delay (LAD)
4	Bhubaneshwar Expressway	Government	Forest land issue	Forest land issue (FLI)
5	GwaliorJhansi Expressway	Concessionaire	Non availability of land and ROW	Land Acquisition Delay
6	IVRCLChandpur Tollways	Concessionaire	Lower Toll collection	Lower Than Expected Revenue (LTER)
7	LucknowSitapur Expressway	Concessionaire	Land Acquisition Delay	Land Acquisition Delay
8	RaiganjDalkhola Highways	Government	Defaults by concessionaire	Financially weak sponsor
9	TantiaRaxaul Tollway	Government	Liquidity crunch of concessionaire	Financially weak sponsor
10	Topworth Tollways	Government	40% work completed	Inefficient Contractor (IC)
11	HoskoteDobbaspet Tollways	Government	Failure to deposit payments (FTDP)	Financially weak sponsor
12	KaranatakaKeralaKannur Tollway	by both parties	Non availability of land and ROW	Financially weak sponsor
13	ObedullaganjBetul Tollway	Government	Failure to deposit payments	Financially weak sponsor
14	PNG Tollway	Concessionaire	state govt. did not support	state govt. did not support
15	Essel Walajahpeth Tollroad	Government	Only 8% work completed	Inefficient Contractor
16	MBLUdaipur Bypass	Government	Failure to deposit payments	Financially weak sponsor
17	VILRohtakJind Highway	Government	Financial issues of sponsor	Financially weak sponsor
18	RaiganjDalkhola Highways	Government	Land Acquisition Delay	Financially weak sponsor
19	Somnath Tollways	Government	Default by concessionaire	Financially weak sponsor
20	PatanaBuxar Highways	Government	Noncompliance of financial closure	No financial closure (NFC)
21	AbhijeetBihar Roadways	Government	Not achieving milestones	Financially weak sponsor
22	Bhubhneshwar Expressway	Concessionaire	Vehicles took alternative route	lack of support from state govt

23	CorsonCorviamTalcher Road	Government	Concessionaire damaged existing road	Inefficient Contractor
24	Chennai Tada Tollways	Concessionaire	Non availability of land (LAD)	Land Acquisition Delay
25	RohtakJind Highway	Government	Diversion of funds by concessionaire	Financially weak sponsor
26	Dehradun Highways	Government	Concessionaire could not arrange funds	Financially weak sponsor
27	Hiranriver Road	Government	Failed to achieve financial closure (NFC)	Financially weak sponsor
28	KishannagarUdaipur Highway	Government	Failed to achieve financial closure	Environmental issues (ENI)
		Terminated State Road Projects		
29	AbhijeetTollRoad Karnataka	Concessionaire	No support from government	No support from government
30	AtlantaRopar Tollways	Concessionaire	No support from government	No support from government
31	Jawasa Road	Government	Nonpayment of penalty	Financially weak sponsor
32	Morena Road	Government	Nonpayment of penalty	Financially weak sponsor
33	ConcastPathBameethaSatna Road	Government	Nonpayment of penalty	Financially weak sponsor
34	Ambha Road	Government	Nonpayment of penalty	Financially weak sponsor
35	Damoh Road	Concessionaire	Government is not releasing annuity	No support from government
36	Dhaneta Road	Government	Nonpayment of penalty	Financially weak sponsor
37	Mora Tollways	Concessionaire	Non receipt grant from government	No support from government
38	SEWLSY Highways	Government	Non achievement of milestone	Financially weak sponsor
39	KMP Expressways	Government	Non achievement of milestone	Inefficient Contractor
40	BagoBaraVasad Expressway	Government	Slow physical progress only 25%	Inefficient Contractor
41	SarangpurSujal tollway	Government	Non achievement of milestone	Financially weak sponsor
42	BhopalBerasia Tollways	Government	No financial closure	Financially weak sponsor
43	BhopalBioara Tollways	Government	No financial closure	Financially weak sponsor
44	SeonoKatangi Tollways	Government	No financial closure	Financially weak sponsor
45	Bela Tollway	Government	Slow physical progress only	Financially weak sponsor
		Terminated Seaports Projects		

46	Multicargoberth at Kandalaport	Government	Concessioner did not pay revenue share (DORS)	Dispute on revenue sharing (DORS)
47	Storage terminals at Kandlaport	Government	Dispute on revenue sharing	Dispute on revenue sharing
48	VizagCargoberth at Vishakhapatnamport	Concessionaire	Issues about rates and tender terms (IARTT)	Dispute on revenue sharing
49	Berth at Vishakhapatnamport	Concessionaire	Issues about rates and tender terms	Dispute on revenue sharing
50	Multipurposebirth at Vishakhapatnamport	Concessionaire	Issues about rates and tender terms	Dispute on revenue sharing
51	Vishakhapatnamport Birth	Concessionaire	Issues about rates and tender terms	Dispute on revenue sharing
Terminated Waste Management Projects				
52	BhilaiDurg wastemanagement	Government	Dispute between parties	Dispute between parties (DBP)
53	Raipur wastemanagement	Government	Dispute between parties	Dispute between parties

Appendix B: The data of delayed and stalled under construction PPP projects in India

Reasons for Delayed and Stalled under construction projects in India			
Sr. No.	**Concessionaire**	**Issue**	**Category of Issue**
1	Rayalseema Expressway	Land Acquisition Delay	Land Acquisition Delay
2	GVRMPBelgaumKhanapur Tollway	Protected forest land patches along project corridor	forest land issue
3	Patna Highway	Land Acquisition Delay	Land Acquisition Delay
4	OrientalNagpur bypass	Forest land 1.25 km issue.	forest land issue
5	Bhubaneswar Expressway	loss of revenue due to alternative routes	Alternative Road
6	NavayugaQuazigund Expressway	Land Acquisition Delay	Land Acquisition Delay
7	Walajahpet Tollroad	Differences between concessionaire and NHAI	Dispute between parties
8	Thrissur Expressway	Only 12 percent work is completed	Inefficient Contractor
9	TrichyKaraikudi	Project was stalled following a state government order	lack of support from state govt
10	TirupatiTiruthani Chennai	Bank Loans to 'IND D' due to issue in serving the debt.	Financially weak sponsor
11	Udupi Tollway	Land Acquisition Delay	Land Acquisition Delay
12	DindigulTheniKumli Tollways	Issue with Tamilnadu Govt.	lack of support from state govt
13	VaranasiAurangabad	Nonavailability of complete right of way	Land Acquisition Delay
14	KMC - IVRCL JV	Concessionaire failed to bring in extra equity.	Financially weak sponsor
15	KrishnagiriTindivanam	Delays in debt servicing	Financially weak sponsor
16	IRBTalegaonAmravati Tollway	Construction of 3.03km stretch delayed due to nonavailability of land.	Land Acquisition Delay
17	SrinagarBanihal Expressway	Series of political events unfolded in Kashmir	Force Majure Event
18	SolapurYedshi Tollway	Land Acquisition Delay	Land Acquisition Delay
19	Solapur Tollways	Slack construction progress by contractor.	Inefficient Contractor
20	Ranchi Expressways	Delayed equity infusion.	Financially weak sponsor
21	GalfarEngineering SAOG	Land Acquisition Delay	Land Acquisition Delay
22	RaebareillyAllahabad Highway	Land Acquisition Delay	Land Acquisition Delay
23	PunjLloyd	Forest Land issue	Environment Issue
24	PanvelIndapur Tollways	Delayed equity infusion (DEI)	Financially weak sponsor
25	Aurang Tollway	Delayed equity infusion	Financially weak sponsor
26	NagpurBetul Highway	Land not available for a 2.38 km stretch of by-pass road	Land Acquisition Delay
27	ERASIBMOST (JV)	Land Acquisition Delay	Land Acquisition Delay

28	MoradabadBareilly Expressway	Land Acquisition Delay	Land Acquisition Delay
29	TantiaRaxaul Tollway	Land Acquisition Delay	Financially weak sponsor
30	Maharashtra/Karnataka BorderSangareddy	Land Acquisition Delay	Land Acquisition Delay
31	SEWKrishnagar-Baharampore	Delay in getting funds	Financially weak sponsor
32	Road Upgradation (KiratpurNer Chowk)	Agitation by affected people for higher compensation.	Agitation by public (ABP)
33	KhedSinnar road	Unwillingness of farmers to handover land	Agitation by public
34	Road Upgradation (KashipurSitarganj)	Land Acquisition Delay	Land Acquisition Delay
35	KaithalRajasthan Border section	Delay in getting land	Land Acquisition Delay
36	IndoreGujarat Tollways	Land falling under a bird sanctuary and a forest.	Environment Issue
37	HoskoteDobbaspet	Delay in getting funds	Financially weak sponsor
38	Dehradun Highways	Financial problems	Financially weak sponsor
39	GwaliorShivpuri Tollroad	Land Acquisition Delay	Land Acquisition Delay
40	GwaliorJhansi Road	Dispute between the parties	Dispute between parties
41	PinkCity Expressway	CBI investing toall collection fraud	Inefficient Contractor
42	GundugolanuVijayawada Road	Concessionaire was facing financial stress	Financially weak sponsor
43	Westcoast Tollway	Land Acquisition Delay	Land Acquisition Delay
44	EtawahChakeri Highway	Land Acquisition Delay	Land Acquisition Delay
45	DhankuniKharagpur Tollway	Project received sanction of premium deferment from NHAI.	Inappropriate bid with premium
46	DA Tollroad	Environmental clearances.	Environment Issue
47	WestHaryana Highways	Land Acquisition Delay	Land Acquisition Delay
48	ChenaniNashri Tunnelway	Land Acquisition Delay	Land Acquisition Delay
49	ChhapraHajipur Expressways	Delays in servicing term loan obligations.	Financially weak sponsor
50	PB Tollway	Land Acquisition Delay	Land Acquisition Delay
51	BarwaAdda Expressway	Land Acquisition Delay	Land Acquisition Delay
52	Bareilly Highways	Red tape in several district administrations	lack of support from state govt
53	BarasatKrishnagar Expressways	Delays in servicing its term loan obligations.	Financially weak sponsor

54	BaharamporeFarakka Highways	Land Acquisition Delay	Land Acquisition Delay
55	YedeshiAurangabad Tollway	Land Acquisition Delay	Land Acquisition Delay
56	LudhianaTalwandi Tollroad	Dispute between contractor and sub-contractors.	Dispute between parties
57	Orissa Expressway	Forest clearance is pending	Environment Issue
58	PS Tollroad	Land Acquisition Delay	Land Acquisition Delay
59	PatnaBakhtiyarpur Tollway	Delay in getting funds	Financially weak sponsor
60	IsoluxSomaNH1 Tollway	Legal Dispute between the parties	Dispute between parties
61	SaiMatarani Tollways	Land required forest department clearance	Environment Issue
62	Simhapuri Expressway	Land Acquisition Delay	Land Acquisition Delay
63	AtlantaSREI Consortium	Land Acquisition Delay	Land Acquisition Delay
64	CochinBridge Infra	Dispute during operation phase between parties.	Dispute between parties
65	North Bihar Highway	Funding issue of concessionaire	Financially weak sponsor
66	SomaIsoluxSuratHazira Tollway	Dispute between the parties about completion of work	Dispute between parties
67	KrishnagiriWalajahpet Tollway	Land Acquisition Delay	Land Acquisition Delay
68	KM Tollroad	Lower than envisaged growth in traffic	Lower Than Expected Revenue
69	JammuUdhampur Highway	Land Acquisition Delay	Land Acquisition Delay
70	IndoreDewas Tollways	Substantial traffic underperformance	Lower Than Expected Revenue
71	GhaziabadAligarh Expressway	Land Acquisition Delay	Land Acquisition Delay
72	FarakkaRaigaji Highways	Land Acquisition Delay	Land Acquisition Delay
73	ChennaiElevated Tollway	Alleged deviation from the approved designs.	Change in project design
74	PanvelIndapur Tollways	Delay in equity infusion equity etc.	Financially weak sponsor
75	TirupatiChennai Tollways	Tolling not satisfactory	Lower Than Expected Revenue
76	WestHaryana Highways	Land Acquisition Delay	Land Acquisition Delay
		Sea port projects	
77	Dighi Port	Less than expected revenue	Financially weak sponsor
78	IndiraContainerTerminal	Bad financial condition of sponsor	Financially weak sponsor
79	GayathriResource wastemanagement	Inefficient contractor as per CAG report	Inefficient Contractor
80	SambhalUPWM	Dispute between parties (DBP)	Dispute between parties
81	BengluruSWM	Dispute between parties	Dispute between parties
82	KannahalliSWM	Dispute between parties	Dispute between parties
83	AhmedabadSWM	Change in government policy	Change in government policy
84	FaridabadSWM	Dispute between parties	Dispute between parties
85	AjmerSWM	Sponsor became bankrupt	Financially weak sponsor

86	GoaSWM	Dispute between parties	Dispute between parties
Hydropower Projects			
87	HimachalSorang hydropower	Accident involving penstock rupture	Environment Issue
88	HimachalSorang hydropower	Sponsor Lanco under CDR	Financially weak sponsor
Water Treatment Projects			
89	Reverse Osmosis water treatment plants in AP	Financial issue, project partially completed	Financially weak sponsor
Ultra Mega Projects			
90	MundraUMPP	Rise in imported coal price made project economically unviable	Rising price of raw material
91	SasanUMPP	The government cancelled the allocation of one of coal block.	Supreme Court scrapped allocations coal blocks.
92	TilaiyaUMPP	Termination of contract over "inordinate delays" in land acquisition.	Land Acquisition Delay
Airport Projects			
93	MopaAirportGoa	Land Acquisition Delay	Land Acquisition Delay
94	NaviMumbaiairport	Land Acquisition Delay	Land Acquisition Delay
Metro Rail Projects			
95	MetroRAILHyderabad	Delay has increased cost of project.	Change in scope

Appendix C-1: The data of NHAT Toll based PPP Road projects in India

NHAI TOLL BASED O+H64+A2:T14+A2:T17+A2:T19+A2+A2:T14

SR NO	NAME OF SPV	Concession Agreement Signing Date	Financial Closure Date	Apointed Date	Construction Completion Date (as per Concession Agreement)	Construction Completion Date (Actual)	Sponsor	Grant	Premium	Debt	Equity	D/E ratio	PROJECTED COST	ACTUAL COST	INCRESE IN COST	INCRESE IN COST %	completion delay in months	CONCESSION DURATION	Rise in revenue
1	Ashoka Sambalpur Bargarh Tollway	29-Jun-10	18/04/2010	14-Nov-11	1-May-14	30-Sep-14	Ashoka Buildcon	0.00	0	800	380	2.10	909	1180	271	29.81%	31	20	5%
2	Badarpur Faridabad Tollway Limited	4-Sep-08	23-Dec-08	23-Dec-08	22-Dec-10	30-Nov-10	HCC	0.00	0	465	107	4.35	340	572	232	68.23%	0	20	5%
3	Private Limited (SPV for Pune Nashik BOT Project)	25-Aug-03	Not Available	25-Aug-03	31-Dec-05	20-Dec-05	IRB	0.00	0	75	52	1.44	74	127.6	53.6	15.76	0	18	5%
4	GMR Ambala Chandigarh Expressways Private	16-Nov-05	Not Available	15-May-06	14-Nov-06	14-Nov-06	GMR Infrastruct	0.00	0	282	328	0.86	298	610	312	104.69	4	20	12%
5	Vijayawada Expressways Private Limited	9-Oct-09	Not Available	6-Apr-10	2-Oct-12	31-Dec-12	Infrastructure	0.00	of reven	1800	290	6.21	1740	2190	450	25.86	3	25	5%
6	Hospet Highway Private Limited	22-Mar-10	18-Sep-10	18-Sep-10	17-Mar-13	31-May-14	Infrastructure	340.92	0	1078	230	4.69	864	1265	401	46.41	15	19	5%
7	IRB Pathankot Amritsar Toll Road Private Limited	16-Nov-09	19-Mar-10	30-May-10	30-Nov-12	30-Nov-14	IRB Infrastruct	126.90	0	1000	450	2.22	705	1445	740	104.96	20	20	10%
8	Lanco Devihalli Highways Private Limited	9-Jul-07	Not Available	5-Jan-08	4-Jul-10	1-Jun-12	Lanco Infratech	175.92	0	351	394	0.89	441	745	304	68.93	24	20	11%
9	Salem Tollways Limited	20-Jan-06	Not Available	Not Available	Not Available	30-Jul-10	IVRCL	0.00	0	245	400	0.61	470	645	175	37.23	NA	20	5%
10	Trichy Thanjavur Expressways Limited	15-Jun-06	12/1/2006	12/12/2006	Jun-09	Apr-15	Projects Ltd.	0.00	0	325	65	5.00	280	390	110	39.28	74	20	5%
11	TK Toll Road Private Limited (Grant 148 cr)	19-Jul-07	Not Available	15-Jan-08	14-Jul-10	30-Jul-12	Reliance Infrastruct	148.50	0	372	449	0.83	755	821	66	8.74	43	30	5%
12	Infra Ltd (12 km)Project cost 46 cr	8-Jul-05	1-Dec-06	4-Jan-07	1-Jul-07	31-Jul-08	Kalyan Toll Infra	0.00	0	64	10	6.40	46	74	28	60.86	7	15	5%
13	IVRCL Chengapalli Tollways Limited	25-Mar-10	Not Available	9-Sep-10	7-Mar-13	30-Apr-15	IVRCL	0.00	0	1000	188	5.32	852	1188	336	39.43	31	27	5%
14	IRB Tumkur Chitradurga Tollway Private Limited	16-Aug-10	11-Feb-11	1-Mar-11	1-Aug-13	16-Jul-14	IRB	0.00	0	1105	155	7.13	839	1215	376	44.81	2	26	5%
15	IRB Surat Dahisar Tollway Pvt Ltd -239 km	30-Apr-08	2-Feb-09	20-Feb-09	18-Aug-11	30-Apr-13	IRB	0.00	0	1237	1300	0.95	1694	2537	843.3	49.77	19	12	10%
16	Ashoka Highways (Bhandara) Limited	18-Sep-07	Not Available	16-Mar-08	30-Oct-10	30-Oct-10	Ashoka	100.00	0	343	192	1.79	528	535	7	1.32	0	20	9%
17	Bangalore Elevated Tollway Limited	25-Jan-06	1-Nov-06	24-Apr-07	24-Jul-08	6-Apr-10	IL&FS	0.00	0	557	433	1.29	775	990	215	27.74	9	20	15%
18	GMR Jadcherla Expressways	26-Feb-06	Not Available	19-Aug-06	19-Feb-09	12-Feb-09	GMR Infra	0.00	0	343	197	1.74	453	516	63	13.9	0	20	5%
19	L&T Devihalli Hassan Tollway Limited	30-Apr-10	Not Available	14-Dec-10	1-May-13	30-Nov-13	L&T IDPLI	180.00	0	268	278	0.96	494	546	52	10.52	0	30	10%
20	Vadodara Bharuch Tollway Limited	12-Jul-06	Not Available	30-Jan-07	31-Jul-09	30-Jun-09	L&T IDPLI	0.00	0	1248	202	6.18	660	1450	790	119.7	0	15	13%
21	TD Toll Road Private Limited	15-Mar-07	Not Available	15-Jan-08	31-Jul-10	12-Jan-12	Reliance Infracture	226.34	0	300	276	1.09	576	576	0	0	29	30	5%
22	Rohtak Panipat Tollway Private Limited	9-Mar-10	18-Apr-11	18-Apr-11	31-Oct-14	6-Jan-14	Sadhbhav	211.50	0	1000	240	4.17	807	1240	433	53.65	3	25	5%
23	IRB Pathankot Amritsar Toll Road Private Limited	16-Nov-09	19-Mar-10	30-May-10	30-Nov-12	30-Nov-14	IRB	126.90	0	950	496	1.92	705	1450	745	105.67	14	20	10%
24	Pondicherry Tindivanam Tollway d Grant 45 cr	19-Jul-07	Not Available	15-Jan-08	1-Jul-10	31-Dec-11	NCC	45.00	0	242	120	2.02	285	362	77	27.01	19	30	10%
24	Ashoka Belgaum Dharwad Tollway	29-Jun-10	3-Dec-10	31-May-11	1-Jun-13	31-Aug-15	Ashoka	0.00	1940 CR	455	175	2.60	480	630	150	31.25	21	30	5%
25	Ashoka Highways Durg Ltd	23-Jan-08	23-Jul-08	23-Jul-08	23-Jul-10	23-Aug-10	Ashoka Buildcon	0.00	0	400	237	1.69	464	637	173	37.28	12	20	8%
26	Baharampore Farakka Highways Ltd	28-Jun-10	31-Oct-10	28-Feb-11	31-Aug-13	25-Oct-13	HCC	0.00	0	650	501	1.30	999	1201	202	20.22	9	25	5%
27	BSCPL Godhra Tollways Limited	25-Feb-10	25-Dec-10	1-Mar-11	1-Aug-13	30-Oct-13	BSCPL Infra	0.00	annual	525	270	1.94	785	794	9	1.5	3	25	9%
28	DS Toll Road Limited	29-Jun-05	29-Dec-05	29-Jul-06	29-Sep-07	September 29, 2009.	Reliance Infra	31.00	0	332	96	3.46	283	428	145	51.23	8	20	10%
29	GMR Ulundurpet Expressways	19-Apr-06	16-Oct-06	16-Oct-06	1-Mar-09	23-Jul-09	GMR Infra	0.00	0	650	363	1.79	480	1013	533	111.04	4	20	5%
30	Guruvayoor Infrastructure	27-Mar-06	Not Available	22-Sep-06	30-Mar-09	5-Nov-11	SREI Infra	0.00	0	550	171	3.22	312	721	409	131.08	0	20	5%
31	GVK Deoli-Kota Expressway Limited	17-May-10	8-Jan-11	8-Jan-11	3-Jul-13	7-Dec-13	GVK Power Infra	0.00	Rs.49 crore	811	215	3.77	593	1043	450	75.88	25	26	5%
32	GVK Jaipur-Kishangarh Expressway Limited	1-May-02	1-Apr-03	1-Apr-03	1-Mar-05	30-Apr-05	GVK Power Infra	211.00	0	1000	130	7.69	614	1130	516	84.04	0	20	13%

SR NO	NAME OF SPV	Concession Agreement Signing Date	Financial Closure Date	Apointed Date	Construction Completion Date (as per Concession Agreement)	Construction Completion Date (Actual)	Sponsor	Grant	Premium	Debt	Equity	D/E ratio	PROJECTED COST	ACTUAL COST	INCRESE IN COST	INCRESE IN COST %	Project completion delay in months	CONCESSION DURATION	Rise in revenue
33	IDAA Infrastructure Private Limited	7-Jul-06	16-Nov-06	16-Nov-08	19-Dec-08	25/12/2008	IRB	0.00		1390	200	6.95	492	1590	1098	223.17	3	15	7%
34	IRB Jaipur Deoli Tollway Private Limited	16-Dec-09	Not Available	14-Jun-10	9-Dec-12	31-Mar-16	IRB	306.00	0	1510	950	1.59	792	1510	718	90.56	9	25	5%
35	JAS Toll Road Company Limited - 32 km	28-Jun-01	Not Available	1-Jun-02	1-Nov-03	31-Dec-03	Jayaswals Neco	0.00	0	200	175	1.14	155	200	45	29.03	1	20	5%
36	L&T Western Andhra Tollways	21-Feb-06	Not Available	19-Aug-06	19-Feb-09	14-Mar-09	L&T IDPL	45.00	0	275	100	2.75	372	375	3	0.81	1	20	12%
37	L&T Krishnagiri Thopur Toll Road	1/17/2006	5/1/2006	5/1/2006	1/16/2009	Feb-09	L&T IDPL	0.00	0	800	90	8.89	525	890	365	69.52	1	20	12%
38	Madurai -Tuticorin Expressways Limited	7/24/2006	1/1/2007	1/20/2007	1/19/2010	Jul-11	Madhucon	114.00	0	750	160	4.69	629	910	281	44.67	18	20	5%
39	Dhule Palesner Tollway Limited	24-Jun-09	19-Dec-09	19-Dec-09	17-Jun-12	28-Feb-16	HCC-Sadbhav	0.00	0	1000	420	2.38	675	1420	745	110.37	0	18	10%
40	Expressway Private Limited	30-Nov-09	28-Sep-11	30-Nov-11	31-Mar-12	31-Jan-15	Realty and Atlantia	201.50	0	1000	371	2.70	835	1371	536	64.19	11	19	10%
41	Hyderabad Yadgiri Tollway Private Limited	24-Feb-10	23-Mar-10	31-Jul-10	10-May-12	10-Dec-12	Sadbhav Infra	0.00	0	375	119	3.15	388	494	106	27.31	7	23	10%
42	JR Toll Road Private Limited	19-Feb-10	Not Available	14-Aug-10	8-Feb-13	15-Jul-13	Reliance Infra	0.00	0	460	130	3.54	267	590	323	120.97	5	18	7%
43	Soma-Isolux-Kishangarh-Ajmer-Beawar Tollway	18-May-09	14-Oct-09	14-Nov-09	12-May-12	30-Apr-15	Soma Enterprise	0.00	2% OR	1200	512	2.34	795	1712	917	115.34	36	18	5%
44	Narmada Infrastructure Construction Enterprise	21-Nov-97	Not Available	Not Available	10-Nov-00	11-Nov-00	L&T IDPL	0.00	0	100	47	2.13	113	147	34	30.08	3	12	5%
45	L&T Western India Tollbridge Limited	1-Mar-99	Not Available	1-May-99	Not Available	13-Feb-01	L&T IDPL	0.00	0	38	14	2.71	42	52	10	23.8	3	10	5%
46	Trichy Tollways Limited	30-Jun-06	1-Nov-06	1-Dec-06	1-Jun-09	1-Sep-09	IJM of Malaysia	0.00	0	1000	371	2.70	751	1371	620	82.56	1	20	10%
47	Talegaon Amravati Tollways	18-Nov-09	1-Apr-10	30-Sep-09	1-Nov-13	30-Apr-13	IRB	216.00	0	616	50	12.32	567	666	99	17.4	0	22	5%
48	MVR Infrastructure & Tollways Private Limited	1/16/2006		16-Aug-06	2/15/2009	8/31/2009	IRB	0.00	0	350	74	4.73	253	424	171	67.58	6	20	12%
49	Lanco Hoskote Highway Private Limited	9-Jul-07	5-Jan-08	5-Jan-08	1-Jul-10	31-Dec-13	Lanco Infratech	189.29	0	700	413	1.69	565	1113	548	96.99	11	20	5%
50	L&T Panipat Elevated Corridor Private Limited	27-Jul-05	1-Dec-05	22-Jan-06	22-Jan-09	1-Jul-08	L&T IDPL	0.00	0	700	85	8.24	270	785	515	190.74	0	20	12%
51	West Gujarat Expressway Limited	22-Mar-05	Not Available	30-Sep-05	31-Mar-08	31-Mar-08	IL&FS TNL	0.00	280	160	150	1.07	273	310	37	13.55	30	20	7%
52	Brij Bhoomi Expressway Private Limited	23-Dec-10	Not Available	9-Oct-12	8-Oct-14	31-May-14	JMC Projects	49.50	0	232	22	10.55	250	254	4	1.6	5	15	5%
53	Wainganga Expressway Private Limited	21-Jun-11	Not Available	9-Apr-12	6-Oct-14	31-Jan-15	JMC Projects	0.00	0	328	172	1.91	484	500	16	3.3	19	18	5%
54	Mumbai Nasik Expressway Limited-	14-Oct-05	1-Feb-06	1-Apr-06	1-Apr-09	31-May-11	Gammon	49.66	0	645	150	4.30	770	805	35	4.54	25	20	5%
55	TN (DK) Expressways Limited	20-Apr-06	1-Oct-06	31-Oct-06	16-Apr-09	5-Nov-09	Madhucon Projects	264.60	0	252	75	3.36	300	327	27	9	7	20	5%
56	KNR Walayar Tollways Private Limited	17-Sep-12	14-May-13	18-May-13	1-Nov-15	1-May-15	KNR	0.00	0	500	400	1.25	790	900	110	13.92	2	20	5%
57	Baleshwar Kharagpur Expressway Limited	24-Apr-12	1-Nov-13	1-Jan-13	29-Jun-15	26-Dec-15	ITNL	35.00	0	396	265	1.49	471	661	190	40.33	6	24	5%
58	Ircon Soma Tollway Private Limited	28-Sep-05	Not Available	31-Mar-06	26-Mar-09	3-Mar-10	Soma	0.00	595 cr	381	400	0.95	556	780	224	40.28	5	20	4%
59	Kurukshetra Expressway Private Limited	13-Jul-10	Not Available	10-May-11	30-Nov-13	30-Nov-13	Projects Limited	0.00	0	500	170	2.94	670	670	0	0	12	28	5%
60	Tirchy Thanjavur Expressways Limited	12-Sep-05	12-Dec-05	Jun-06	Jan 11,2011.	May 2011.	Madhucon Projects	0.00	0	300	90	3.33	280	390	110	39.28	70	20	85
61	Swarna Tollway Private Limited	1-Mar-01	Not Available	1-Aug-01	1-Dec-03	1-Sep-04	Infrastructure	0.00	0	494	250	1.98	621	744	123	19.8	5	30	5%
62	Oriental Pathways Indore Pvt. Ltd.	10-Mar-06	6-Sep-06	6-Sep-06	1-Sep-09	31-Aug-09	Oriental	0.00	crore to	550	225	2.44	550	775	225	40.9	3	20	55
63	Khed Sinnar Expressway	8-May-13	30-Nov-13	12-Feb-14	10-Aug-16	30-Sep-17	ITNL	296.60	0	1415	600	2.36	1348	2015	667	49.48	5	20	10%
64	Ghaziabad Aligarh Expressway Pvt. Ltd	20-May-10	24-Jan-11	25-Feb-11	24-Aug-13	30-Sep-17	BRNL	311.00	0	1515	605	2.50	2025	2120	95	4.48	22	24	5%
65	Oriental Pathways (Agra) Private Limited	10-Mar-06	6-Sep-06	6-Sep-06	6-Mar-09	1-Jul-09	Strctural Engineers	0.00	0	120	103	1.17	195	223	28	14.35	4	20	5%

Appendix C-2: The data of NHAT Annuity based PPP Road projects in India

NHAI ANNUITY																				
SR NO	NAME OF SPV	Concession Agreement Signing Date	Financial Closure Date	Apointed Date	Construction Completion Date (as per Concession Agreement)	Construction Completion Date (Actual)	Sponsor	Grant	Premium	Debt	Equity	D/E ratio	PROJECTED COST	ACTUAL COST	INCRESE IN COST	INCRESE IN COST %	ject completion del	CONCESSION DURATION	Rise in revenue
1	Andhra Pradesh Expressway Limited	20-Mar-06	20-Sep-06	20-Jan-07	20-Jan-09	20-Feb-09	ITNL	0.00	0	560	150	3.73	490	710	220	44.9	1	20	NO
2	Expressways Private Limited	Oct-05	28-Dec-05	28-Dec-07	28-Dec-08	20years	GMR	0.00	0	1238	250	4.95	824	1488	664	80.58	24	15	NO
3	Jorabat Shillong Expressway Limited	16-Jul-10	21-Oct-10	12-Jan-11	11-Jan-14	20years	ITNL	0.00	0	400	123	3.25	472	472	0	0	9	20	NO
4	Patel-KNR Infrastructure	28-Sep-06	28-Dec-06	25-Mar-07	26-Mar-09	21-Dec-09	Patel	0.00	0	219	29	7.55	212	248	36	16.98	0	18	NO
5	Andhra Expressway Limited	16-Jul-99	16-Oct-99	16-Oct-99	16-Oct-00	16-Oct-00	Gammon	0.00	0	322	78	4.13	283	400	117	41.34	2	18	NO
6	GMR Tuni - Anakapalli Expressways	4-May-99	4-Aug-99	May-02	Aug-04	Dec-04	GMR	0.00	0	371	107	3.47	362	478	116	32.04	0	18	NO
7	GMR Tambaram-	9-Oct-01	26-Jun-02	9-May-02	9-Nov-04	1-Jan-05	GMR	0.00	0	437	86	5.08	475	523	48	33.68	2	17	NO
8	L&T Interstate Road Corridor Limited	27-Oct-06	28-Jun-06	28-Jun-06	28-Jun-08	28-Jun-08	L&T	0.00	0	478	121	3.95	520	599	79	15.19	2	17	NO
9	O B Infrastructure Limited-62km	27-Apr-06	27-Jul-06	24-Oct-06	23-Apr-09	31-Jul-11	NCC	0.00	0	272	43	6.33	275	315	40	14.55	0	20	NO
10	Nirmal BOT Limited-36km	4-May-07	4-Nov-07	31-May-07	30-Nov-09	31-Jul-09	HCC	0.00	0	263	52	5.06	256	315	59	23.04	2	17	NO
11	Rajahmundry Expressway Ltd.- 53km	30-Oct-01	30-Dec-01	30-May-02	2-Nov-04	1-Mar-05	Gammon	0.00	0	480	118	4.07	518	598	80	15.44	4	20	NO
12	Patel KNR Heavy Infrastructure	5-Sep-07	Not Available	1-Mar-07	3-Mar-10	11-Jun-10	Patel	0.00	0	215	35	6.14	240	250	10	4.16	52	20	NO
13	Malaxmi Highways Private Limited- 40 km	29-Sep-06	22-Mar-07	28-Mar-07	29-Sep-09	31-Jan-14	Meenakshi Infra	0.00	0	485	129	3.76	332	614	282	84.93	0	20	NO
14	North Karnataka Expressway	20-Nov-01	1-Dec-01	20-Jun-02	19-Dec-04	19-Jul-04	ITNL	0.00	0	150	50	3.00	205	205	0	0.48	4	20	NO
15	Rohan Rajdeep Toll Roads	18-Dec-07	Not Available	15-Jun-08	18-Jun-10	30-Jun-10	Rohan Rajdeep	0.00	0	450	70	6.43	520	520	0	0	1	20	NO
16	Gorakhpur Infrastructure Company Limited-32km	1-Oct-06	Not Available	6-Apr-07	6-Oct-09	30-Mar-12	Gammon	0.00	0	700	130	5.38	570	830	260	45.61	0	15	NO
17	PNC Raebareli Highways Private Limited-166km	9-Nov-12	Not Available	4-Jun-14	3-Jun-16	1-Feb-16	PNC	0.00	0	622	46	13.52	567	668	101	29.62	5	15	NO
18	Khagaria Purnea Hi Ltd.	1-Feb-11	30-May-11	31-Oct-11	28-Feb-14	30-Apr-13	Punj Lloyd	0.00	0	493	92	5.36	332	585	253	76.2	32	20	NO
19	Gwalior Bypass Project Limited	9-Oct-06	Not Available	7-Apr-07	6-Oct-09	30-Apr-14	Era Infra	0.00	0	198	62	3.19	226	260	34	15.04	0	15	NO
20	Shillong Expressway Limited-61km	16-Jul-10	21-Oct-10	12-Jan-11	11-Jan-14	11-Jan-14	Chetak	0.00	0	575	60	9.58	635	635	0	0	2	15	NO
21	Essel Lucknow-Raebareli Toll Roads	3-Feb-12	31-Mar-12	18-Jul-12	31-Jul-14	30-Apr-15	Essel Infra	0.00	0	400	40	10.00	360	440	80	22.22	7	20	NO
22	Adilabad Expressway	9/5/2007	9/5/2007	Nov-07	Nov-09	Nov-09	Soma	0.00	0	137	45	3.04	143	182	39	27.77	0	17	NO
23	NYSE Infrastructure	27-Mar-02	1-Sep-02	1-Oct-02	1-Oct-04	1-Aug-04	Somaises Ltd	0.00	0	300	50	6.00	350	350	0	0	16	15	NO
24	Mokam	12-Jul-10	Not Available	15-May-11	14-May-13	31-Jan-13	BSCPL	0.00	0	245	67	9.06	276	312	36	13.04	27	20	NO
25	Gayatri Lalitpur Roadways Limited-49km	30-Sep-06	Not Available	28-Mar-07	28-Sep-09	31-Jul-10	Gayatri Projects	0.00	0	700	200	3.50	900	625	275	30.55	0	18	NO
26	Ranchi Hazaribagh Expressway	8-Oct-09	Not Available	1-Aug-10	27-Jan-13	30-Apr-15	ITNL	0.00	0	400	70	5.71	350	350	0	0	16	13	NO

Appendix C-3: The data of State Roads PPP projects in Indi

STATE PPP ROAD PROJECTS																		
1	AAP Infrastructure Private Limited	11/18/2002	12/18/2002	3/24/2004	2/25/2005	10/25/2005	IRB	0.00	0	52	44	1.18	88.00	96.00	8.00	9.09	0	16
2	Aryan Toll Road Private Limited	20-Mar-03	20-Apr-03	20-Apr-03	20-Mar-05	10-Dec-04	IRB	0.00	0	182	95	1.92	190.00	277.00	87.00	45.79	0	24
3	Aurangabad Jalna Tollway	1-Feb-07	1-Mar-07	1-Mar-07	30-Jul-09	30-Jul-09	IRB	0.00	0	312	161	1.94	359.00	473.00	114.00	31.75	0	15
4	East Hyderabad Expressway	17-Aug-07	17-Oct-07	17-Nov-07	30-Jun-10	16-Aug-12	ITNL	0.00	0	238	67	3.55	177.00	305.00	128.00	72.31	0	25
5	Essle Mhow Ghatabillod Toll Roads	7-Sep-11	2-Mar-12	2-Mar-12	6-Sep-14	31-Dec-12	Essel Infra	0.00	0	35	10	3.50	15.00	45.00	30.00	200.00	4	15
6	Fekari Infrastructure Private Limited	30-Sep-08	Not Available	Not Available	Not Available	30-Jun-09	Vishvaraj Infra	0.00	0	550	230	2.39	750.00	780.00	30.00	4.00	13	17
7	GF Toll Road	31-Jan-09	31-May-09	1-Jun-09	31-May-11	29-Jun-12	Reliance Infra	0.00	0	775	306	2.53	864.00	1081.00	217.00	25.11	21	20
8	GMR Chennai Outer Ring Road	5-Dec-09	3-Jun-10	30-Jun-10	2-Dec-12	28-Aug-14	GMR	0.00	0	1285	234	5.49	1015.00	1519.00	504.00	51.62	0	22
9	L&T Ahmedabad Maliya (rajkot)Tollway	17-Sep-08	Not Available	12-Oct-09	4-Dec-12	1-Nov-12	L&T	0.00	0	1085	218	4.98	808	1303	495	61.26	5	20
10	L&T Halol Godhra Shamlaji Tollway	17-Sep-08	Not Available	12-Sep-09	12-Nov-11	30-Apr-12	L&T	0.00	0	825	230	3.59	774	1055	281	36.03	3	20
11	L&T Rajkot Vadinar Tollway	17-Sep-08	Not Available	12-Sep-09	12-Nov-11	1-Feb-12	L&T	0.00	0	22	35	0.63	57	57	0	0	4	15
12	MSK Infrastructure and Toll Bridge	5/7/2003	10/21/2004	10/21/2004	5/6/2005	15-Sep-05	MSK	0.00	0	440	190	2.32	408	630	222	54.41	0	30
13	Noida Toll Bridge Company Ltd	12-Nov-97	1-Dec-98	30-Dec-98	1-May-01	7-Feb-01	ILFS	23.30	0	100	57	1.75	116	157	41	35.34	1	18
14	Essel Sagar-Damoh Toll Roads Limited	26-Feb-10	25-May-10	25-May-10	25-Feb-12	5-May-12	Essel Infra	247.00	0	400	501	0.80	650	901	251	38.61	8	25
15	Sikar Bikaner Highway	29-Jun-12	17-Feb-13	18-Feb-13	17-Feb-15	30-Sep-17	ITNL	0.00	0	211	60	3.52	206	271	65	31.55	0	25
16	Valecha LM Toll Pvt. Ltd.	4-May-10	27-Oct-10	27-Oct-10	26-Oct-12	30-Nov-11	Valecha	0.00	0	350	110	3.18	383	459	76	19.84	5	28.5
17	Supreme Manor Wada Bhiwandi Infrastructure	8-Mar-10	20-Aug-10	22-Oct-10	22-Oct-12	27-Feb-13	Supreme	0.00	0	650	128	5.08	736	778	42	5.7	24	30
18	Vindyachal Expressway Pvt. Ltd.-JMC Projects Ltd	4/27/2012	4/15/2013	4/15/2013	4/26/2014	4/4/2016	JMC Projects	0.00	0	120	45	2.67	165	165	0	0	1	15
19	Viva Highways Limited	22-Sep-01	10-Jan-02	5-Mar-03	30-Oct-03	30-Nov-03	Ashoka Buildcon	0.00	0	134	36	3.72	124	170	46	37.09	25	16.5
20	Atlanta Ropar Tollways	5-Oct-11	15-Apr-13	15-Apr-13	14-Oct-14	9-Nov-16	Atlanta	0.00	0	252	70	3.60	220	322	102	46.36	23	22
21	Bhilwara Jaipur Toll Private Limited	12-Jul-10	28-Jul-11	2-Feb-12	28-Jan-13	15-Jul-15	OM Metals Infra	0.00	0	60.75	28.75	2.11	56	88	32	57.14	4	15
22	Chetak Mitra Tollway	17-Jan-12	17-Mar-12	30-Apr-12	29-Apr-13	27-Aug-13	Chetak	0.00	0	300	105	2.86	403	405	2	0.49	26	15
23	Cyberabad Expressways Limited	12-Aug-07	12-Dec-07	20-Dec-07	30-Jun-10	16-Aug-12	Gayatri Projects	0.00	0	95	22	4.32	33	117	84	254.54	5	15
24	DBL Bankhlafata Dogawa Tollways	28-Jan-13	3-Oct-13	Not Available	Not Available	31-Mar-14	Dilip Buildcon	0.00	0	245	25	9.80	231	271	40	17.31	0	15

SR NO	NAME OF SPV	Agreement Signing	Closure Date	Apointed Date	n Completion	n Completion	Sponsor	Grant	e mi	Debt	Equity	D/E ratio	TED COST	ACTUAL COST	SE IN COST	E IN COST %	ect co	ESSIO N
25	DBL Betul Sarni Tollways	20-May-13	7-Apr-14	7-Apr-14	19-May-15	12-May-15	Dilip Buildcon	0.00	0	70	28	2.50	84	98	14	16.66	0	15
26	DBL Sardarpur Badnawar Tollways	29-Jun-11	16-Dec-11	16-Dec-11	28-Jun-13	9-Jun-12	Dilip Buildcon	0.00	0	94	52	1.81	121	146	25	20.66	0	15
27	DBL Silwani Sultanganj Tollways	8-Sep-11	27-Feb-12	27-Feb-12	7-Sep-13	25-Mar-13	Dilip Buildcon	0.00	0	365	61	5.98	426	426	0	0	50	25
28	Dewas Bhopal Corridor nt 81 cr-till 27-Dec-2032	30-Jun-07	20-Mar-08	20-Mar-08	21-Sep-10	30-Apr-10	Chetak	0.00	0	11	5	2.20	16	16	0	0	8	15
29	Dinara Dhatia D.P. Jain Pathways Private Limited	9-May-12	2-Feb-13	2-Feb-13	1-Feb-15	27-Jan-15	D.P. Jain	0.00	0	170	90	1.89	212	260	48	22.64	4	18
30	Essel Sagar Damoh Toll Roads(Jabalpur) Limited	7-Aug-09	25-May-10	27-May-10	26-Feb-12	31-Mar-13	Essel Infra	0.00	0	77	30	2.57	97	107	10	10.3	5	15
31	GVR Panna Amanganj Tollway Pvt. Ltd.	5-Nov-11	2-May-12	2-May-12	4-Nov-13	28-Feb-14	GVR Infra	48.34	0	150	120	1.25	230	270	40	17.39	5	30
32	Ramnagar Tollway Infraprojects	4-Jun-10	3-Dec-10	3-Dec-10	27-Aug-13	27-Aug-13	GVR Infra	0.00	0	195	193	1.01	388	388	0	0	27	15
33	Hyderabad Expressway Limited	03/08/2007	10/12/2007		9/6/2010		ITNL	0.00	0	300	300	1.00	390	600	210	53.84	27	15
34	Hyderabad Ring Road Project Private Limited	12-Dec-07	Not Available	Not Available	31-Jul-10	16-Aug-12	era Infra	0.00	0	612	100	6.12	403	712	309	76.67	7	25
35	Road Company Private Limited	30-Aug-07	20-Aug-08	25-May-08	26-Nov-10	17-Feb-12	Ashoka Buildcon	0.00	0	52	20	2.60	29	72	43	148.27	0	12
36	Kalthia Infra-con Private Limited	2-Mar-02	Not Available	6-Mar-02	15-Oct-09	15-Oct-09	kalthia	0.00	0	90	86	1.05	150	176	26	17.33	5	28
37	Kalyan Keti Toll Private Limited	16-Jun-11	17-Jul-12	Not Available	3-Nov-13	15-Apr-14	kalyan Group	0.00	0	225	50	4.50	227	275	48	21.14	10	23.5
38	Kalyan Sangam Infratech Ltd.	3/23/2009	12-Jan-09	12-Jan-09	12-Jan-11	9-Nov-11	kalyan Group	0.00	0	40	32	1.25	72	72	0	0	2	11.5
39	NSP BVSR KP Road Projects	25-Jan-10				31-May-14	NSPR const	0.00	0	460	144	3.19	355	604	249	70.14	7	25
40	PNC Bareilly Nainital Highway	8/11/2011	3/17/2012	3/15/2013	3/5/2015	19-Oct-15	PNC Infra	0.00	0	570	500	1.14	593	1070	477	80.43	42	33
41	Rajahmundry Godavari Bridge Limited	5-Nov-08	26-May-09	Not Available	31-May-12	1-Nov-15	Gammo n	0.00	0	232	100	2.32	332	332	0	0	32	15
42	Ramky Elsamex Hyderabad Ring Road	27-Nov-07	Not Available	Not Available	30-Nov-09	16-Aug-12	Ramky Infra	0.00	0	24	12	2.00	34	36	2	5.88	13	15
43	Rewa Pathways Pvt. Ltd.- 16 KM-	22-Mar-11	10/5/2011	10/5/2011	3/21/2013	4/3/2014	Prakash Asphalit	0.00	0	122	30	4.07	152	152	0	0	0	15
44	SEW Bellary Highways Limited	16-Aug-10	8-Feb-11	7-Nov-11	5-Nov-13	8-Mar-14	SEW infra	0.00	0	72	38	1.89	110	110	0	0	2	17.5
45	TRDCL -PHASE I	16-Mar-04	16-May-04	16-May-04	16-Nov-06		ITNL	0.00	0	210	95	2.21	276	305	29	10.14	2	15
46	Transstroy Bhopal Bypass Tollway	18-Nov-10	31-May-11	31-May-11	30-May-13	26-May-13	Transstr oy	0.00	0	90	50	1.80	70	140	70	100	4	15
47	Ujjayini Highways Private Limited	12-Jun-13	12-Dec-13	5-May-14	16-Dec-15	21-Oct-15	kalyan Group	0.00	0	625	200	3.13	420	825	405	96.42	3	25
48	Western MP Infrastructure and Toll	30-Aug-07	19-Mar-08	25-Mar-08	19-Aug-09	4-Jun-11	Essel Infra	467.00	0	1060	700	1.51	1196	1760	564	47.15	8	24
49	N.A.M Expressway Limited	23-Jul-10	11-Jan-11	19-Jan-11	7-Jul-13	6-Mar-14	Ramky Infra	0.00	0	1141	411	2.78	1000	1552	552	55.2	12	24
50	Maharashtra Border Check Post Network	5-May-09	5-Oct-09	5-Oct-09	30-Oct-11	30-Oct-19	sadbhav	0.00	0	60	12.98	4.62	59.8	72.98	13.18	22.04	2	15

Appendix D: Contractual Issues in PPP Projects

Contractual Issues in PPP Projects				
SR. No.	Sector	Name of the project	Contractual Issue observed in the project	Type of Contractual Issue
1	NHAI operational toll roads	Badarpur Faridabad Toll way Limited	The supreme court order to ban commercial vehicle on this project stretch in 2017 made the project financially unviable hence the SPV terminated the project as a clause of political force majeure in the concession agreement	Political force majeure
2	NHAI operational toll roads	GMR Ambala Chandigarh Expressways Private Limited	SPV has claimed losses due to traffic diversion	Alternate Road
3	NHAI operational toll roads	TK Toll Road Private Limited	Tolling has commenced only on 75% of the earlier expected project length; scope of the remaining project stretch of 17 km to be revised and subsequently approved by court. Cost over-runs due to delays of over three years in project completion, resulting in subdued return indicators.	Change in Scope
4	NHAI operational toll roads	Vadodara Bharuch Tollway	Revenue was stagnant in FY16 and FY17 levels due to the construction of the Narmada bridge that led to traffic congestion and the consequent traffic leakage through alternate routes	Alternate Road
5	NHAI operational toll roads	Pondicherry Tindivanam Tollway	Project cost has exceeded INR. 300 crore.	Bankrupt Sponsor
6	NHAI operational toll roads	Baharampore Farakka Highways Ltd(HCC)	The incomplete stretch (25%)	Incomplete stretch due to non availability of land
7	NHAI operational toll roads	Guruvayoor Infrastructure	GIPL filed a petition with Kerala High Court which ordered the toll hike which was denied by the government	Toll Hike dispute
8	NHAI operational toll roads	GVK Jaipur-Kishangarh Expressway Limited	The SPVGVKJEPL failed serving the debt due to blocking of escrow amount by the lender. The sponsor has given funds or serving the debt	Issue with lender
9	NHAI operational toll roads	L&T Western Andhra Tollways Limited	Depressed traffic growth witnessed in FY 2014, especially in the 2-Axle, 3- Axle and Multi-Axle truck categories, in the backdrop of weak macroeconomic conditions and the political and economic uncertainty following the Telangana agitations prior to the state bifurcation in 2014.	Political force majeure
10	NHAI operational toll roads	Pune-Solapur Expressway	Multi-axle vehicular segment which decreased in FY2017 due to sand mining ban (the ban continues as on date) at Bhima River	Change in Law

11	NHAI operational toll roads	Soma-Isolux-Kishangarh-Ajmer-Beawar Tollway	NHAI failed to grant 100% right of way as envisaged in the Concession agreement. The Arbitration regarding change of scope and Provisional completion certificate.	Change of scope
12	NHAI operational toll roads	Trichy Tollways (Madhucon)	low revenue impact due to slow growth in traffic from light commercial vehicles/multi axle vehicles or decline in bus/truck traffic growth due to a ban on sand mining	Change in Law
13	NHAI operational toll roads	Talegaon Amravati Tollways	The leakage of traffic to adjacent sections of state highways	Alternate Road
14	NHAI operational toll roads	Lanco Hoskote Highway	The SPV defaulted on bank loan hence the senior lender State Bank of India decided to substitute the developer through fresh bidding under the clause of concession agreement	The lender step in
15	NHAI operational toll roads	Brij Bhoomi Expressway Private Limited(JMC Projects)	High dependence on overloading charges, which attributed to 27% of the company's toll collections in FY2017; any change in the regulations, like disallowance of overloading vehicles given the safety concerns, could adversely impact the company's cash flows. Due to the increase in the tolling on this route, part of the Ghaziabad-bound traffic has now diverted to Yamuna Expressway.	Change in regulation
16	NHAI operational toll roads	Mumbai Nasik Expressway Limited(Gammon)	The upcoming Mumbai Nagpur Super Communication Expressway (MNSCE) could be competing with the project stretch. Nagpur bound traffic could witness some shifts to MNSCE once it becomes operational. MNSCE is currently in nascent stages of execution, the timelines of project execution and % of shift in traffic would remain key rating sensitivities	Alternate Road
17	NHAI operational toll roads	Baleshwar Kharagpur Expressway Limited	Deteriorating financial health of BKEL's sponsor IL&FS Transportation Networks Limited. The sponsor undertaking to provide necessary support to BKEL to meet its financial obligations.	Bankrupt Sponsor
18	NHAI operational toll roads	Ircon Soma Tollway	NHAI imposed penalty for poor maintenance recovered hrough the balance grant.The first major maintenance cycle led to higher operating expenses.	Poor maintenance by the SPV
19	NHAI operational toll roads	Oriental Pathways (Agra) Pvt.ltd.	Arbitration case file in court	Court Dispute
20	NHAI operational annuity roads	Jorabat Shillong Expressway Limited (ITNL)	The NCDs issued by JSEL to different fund-houses, including UTI MF, are to be repaid in various tranches mapped to the semi-annual receipt of annuities over the concession period. Ratings of JSEL NCDs downgraded gradually from AAA (SO) to D. The ratings by CARE Ratings is also INR D. UTI Mutual Fund has cut the value of its original investment in JSEL 50%	Bankrupt ILFS

21	NHAI operational annuity roads	Patel-KNR Infrastructure Private Limited	Large deduction (Rs.15.29 crore) in annuity by NHAI due to delay in completion of last major maintenance. As per Operation & Maintenance (O&M) support undertaking performance deduction will have to be reimbursed by the sponsors i.e. Patel Engineering Ltd and KNR Constructions Ltd. The sponsors have infused Rs.15.20 crore in the SPV post the annuity deduction.	Default in maintenance by SPV
22	NHAI operational annuity roads	GMR Tuni - Anakapalli Expressways	The company withdrew funds from the sub-accounts3 of Trust & Retention Account (replaced it with a bank guarantee of INR 45 crore) and advanced to Group companies.	Accounting malpractices
23	NHAI operational annuity roads	GMR Tambaram-Tindivanam Expressways	GTTEL lend money to other group companies creating liquidity issue.The SPV claimed INR 25 from NHAI in arbitration.	Accounting malpractices
24	NHAI operational annuity roads	Patel KNR Heavy Infrastructure	PKHIL has received its 16th annuity in March 2018 from NHAI with a large deduction (Rs.15.29 crore) due to delay in completion of last Major Maintenance.	Default in maintenance by SPV
25	NHAI operational annuity roads	Gwalior Bypass Project Ltd(Era Infra)	NHAI delayed the payment of annuity	Delayed annuity payment due to delay in COD
26	NHAI operational annuity roads	Lucknow-Raebareli Toll Roads	The sponsor, Essel Infraprojects Limited (EIL), deposited the amount of annuity deducted by NHAI due to delay in carrying out major maintenance activity	Default in maintenance by SPV
27	NHAI operational annuity roads	Adilabad Expressway Private Limited(Soma Enterprise)	NHAI deduct the annuity for delay in major maintenance. The SPV approached the arbitration against this deduction	Default in maintenance by SPV
28	NHAI operational annuity roads	NYSE Infrastructure	The sponsor ,Soma Enterprises Limited (SEL) whose financial profile is weak which has approached the lenders for resolution of debt under S4A.Credit rating of NYSE is D.	Bankrupt Sponsor
29	NHAI operational annuity roads	Mokama-Munger Highway	Absence of internal liquidity in the form of a debt service reserve account. Also, floating interest rates render cash flows vulnerable to stress. The sponsor BSCPL 's financial profile is weak	Bankrupt Sponsor
30	NHAI operational annuity roads	Ranchi Hazaribagh Expressway	Bankruptcy of sponsor IL&FS	Bankrupt spo ILFS
31	NHAI operational annuity roads	Hyderabad Vijayawada Expressways	CARE had downgraded SPV to CARE D or default rating due to default in debt serving.	Liquidity problem of SPV
32	State Roads	East Hyderabad Expressway	Delay in getting the annuities. The sponsor ILFS become bankrupt	Bankrupt sponsor ILFS

33	State Roads	GMR Chennai Outer Ring Road	The sponsor GMR Infra providing guarantee to SPV for debt servicing turned financially weak.	Liquidity problem of SPV
34	State Roads	Ahmedabad Maliya(Rajkot)Tollway	The authority GSRDC can extend the contract terms in case of lower than expected toll collection	Liquidity problem of SPV due to lower toll
35	State Roads	L&T Halol Godhra Shamlaji Tollway Limited	The revenue of the project impacted due to competing route developed by the Gujarat government hence the SPV issued termination notice to GSRDC.	Alternate Road
36	State Roads	Noida Toll Bridge Company Ltd (ILFS)	The SPV filed court case against the authority NOIDA for breaching contract terms and obligations. The Allahabad high court prevented SPV from collecting toll.	Conflict with authority on contract terms
37	State Roads	Sikar Bikaner Highway Limited	The downgrade and the RWN resolution follow the classification of Sikar Bikaner Highway under 'Red – Indian IL&FS Group Entities' category in the National Company Law Appellate Tribunal order dated 12 February 2019,	Bankrupt Sponsor ILFS
38	State Roads	Viva Highways	Arbitration case against MPRDC	Dispute with authority
39	State Roads	Bhilwara Jaipur Toll	Termination notice from concessionaire Om metal.	Alternate Road
40	State Roads	Cyberabad Expressways	Delayed annuities from Hyderabad Growth Corridor Ltd with arrears of 140 Cr	Delayed annuity from authority
41	State Roads	Panna Amanganj Tollway	The sponsor, GVR Infra Projects, is under the Structuring of Stressed Assets Scheme.	Bankrupt sponsor
42	State Roads	Dharwad Ramnagar Tollway	The sponsor, GVR Infra Projects, is under the Structuring of Stressed Assets Scheme	Bankrupt sponsor
43	State Roads	Hyderabad Expressway Limited	Delayed annuities from Hyderabad Growth Corridor Ltd (HGCL), the Concessioning Authority. Delay in recovery of loans and advances extended to its group entity, Cyberabad Expressways Ltd.	Delayed annuity from authority
44	State Roads	Hyderabad Ring Road Project	Sponsor Era Infra-NCLT Case	Bankrupt sponsor
45	State Roads	Kalyan Keti Toll Pvt ltd	Exemption in Toll for certain category of vehicle from Government of Maharashtra in 2015	Exemption in toll by authority
46	State Roads	Kalyan Sangam Infratech Ltd	Exemption in Toll for certain category of vehicle from Government of Maharashtra in 2015	Exemption in toll by authority
47	State Roads	Rajahmundry Godavari Bridge Limited	The lender opted for substitute of SPV due to default in debt servicing	Lender step in

48	State Roads	Ramky Elsamex Hyderabad Ring Road	Sponsor Ramky Infra's debt was restructured in June 2015 by the Joint Lenders Forum comprising seven lenders.	bankrupt sponsor
49	State Roads	SEW Bellary Highways	Delay in annuity payments from Karanataka Road Development Corporation	Delayed annuity from authority
50	State Roads	TRDCL Phase I (Tiruvananthpuram road	Sponsor ITNL become bankrupt	Bankrupt sponsor ILFS
51	State Roads	Transstroy Bhopal Bypass Tollway	Sponsor Transstroy become bankrupt.	Bankrupt. sponsor Transstroy
52	Metrorail PPP projects	L&T Metro Rail Hyderabad Private Limited	The time delays have led to cost overrun to INR189.75 billion from INR163.75 billion. The sponsor has to inject additional equity of INR8.18 billion to comply with the cost overrun support obligation.	Heavy time and cost overrun & equity infusion by sponsor
53	Metrorail PPP projects	Mumbai Metro One Pvt.Ltd.	Delay in servicing of debt resulted into credit rating of D	Bankrupt Sponsor
54	Metrorail PPP projects	Rapid Metrorail Gurgaon South Limited (ILFS)	Significantly lower-than-expected ridership led to weak operational cash flows, thereby making RMGSL reliant on its sponsors for meeting its obligations in a timely manner. The delay in the opening of DMRC-Phase III has impacted the ridership.	Liquidity issues
55	Operational Hydro PPP project	AD hydro Power Corporation Limited (192 MW Bhilwara Energy Group.	Reliastion decreased to INR2.97/kWh from INR3.52/kWh in line with the decline in short-term power prices, as ADHPL is a merchant power plant.Weak financial health of state power utilities (SPUs), the ultimate consumers of the company. Lower-than-expected EBITDA.	Change in macroeconomy
56	Operational Hydro PPP projects	Malana Power Company Limited-86 MW (86MW run-of-the-river hydroelectric plant in the Kullu district of Himachal Pradesh.)	The company's net saleable energy after providing free energy to its home state of Himachal Pradesh declined due to a drop in water availability. MPCL has dispute with Himachal Pradesh State Electricity Board about the payment of wheeling charges	Dispute with authority
57	Operational Hydro PPP projects	Himamchal Baspa Power co ltd	Baspa hydro power plant has long term PPA with Himachal Pradesh State Electricity Board of sharing 15% power	Change in sponsor

58	Operational Hydro PPP projects	Vishnuprayag Hydro Electricity Project	The river is fed by melting of glacier than the rain water	Force majure
59	Operational Hydro PPP projects	1091 MW capacity at Karcham Wangtoo	The hydro plant at Karcham is also tied up under a long term PPA for its entire operative capacity with 15% power sharing with PTC	Change in sponsor due to sale
60	Operational Hydro PPP projects	Teesta hydro power project	The SPV sold to NHPC	Change in sponsor due to sale
61	PPP Seaport project	Karaikal Port Private Limited(Marg Ltd)	Substantial cargo throughput underperformance at the port in FY14 and FY15. Due to the absence of pick up in cargo demand in the vicinity of the port the cargo ramp-up has been below management estimates since inception.	Weak financial condition
62	PPP Seaport project	South West Port Limited(JSW Infra)	Goa State Pollution Control Board's (GSPCB's) decision to revoke the consent-to-operate awarded to JSW Infra group's terminal at the major port of Mormugao .The revocation follows GSPCB's assertion that the group handled more-than-permitted cargo at the port, thereby endangering the environment.	Default by the SPV
63	PPP Seaport project	Angre Port Private Limited	APPL's royalty payments to Maharashtra Maritime Board have a 20% YoY escalation clause; however with the base charge being low, the company could not pay the royalty.	Default by SPV
64	PPP Seaport project	Visakha Container Terminal Limited	Delays in handover of the site by the port trust for execution of the project. .VCTPL's terminal is regulated under TAMP's tariff guidelines of 2005 and the tariffs are revised once every three years. Tariffs were increased by 13% in 2016 but future adverse rulings on tariff result in margin erosion.	Regulatory Issue
65	PPP Seaport project	Chettinad International Coal Terminal	Court case between Chettinad SPV and Kamraj port in Chennai high court about revenue sharing	Revenue sharing dispute
66	PPP Seaport project	Encores Tank Terminal	ETTPL face competition from the new facilities of Indian Oil Corporation ands and Kamaraj Port	Alternate /Competing facility
67	PPP Seaport project	Gangavaram Port Limited	The central government's proposal to form a joint venture of its own Visakhapatnam port with state owned Gangavaram port rejected by the state government quoting it may affect the revenue and viability of Gangavaram port	Alternate /Competing facility
68	PPP Seaport project	Dighi Port Maharashtra's Raigad District	The proposal by government owned JNPT to acquire Dighi port was approved by the lenders.JNPT offered INR 600 crores and equity infusion to prevent bankruptcy of the air and continue its operation	Takeover by the authority
69	PPP Seaport project	Vizag Seaport Pvt.Ltd.	Gammon Infrastructure sold it to Lastin Infrastructure Projects Ltd.	Bankrupt sponsor
70	PPP Seaport project	RAS Infraport Pvt Ltd (Kandla Port Trust)	Authority blamed the operator of not paying revenue share as per contract terms while the contractor blamed the authority in failing in its obligation to provide rail connect and water depth in given time frame delaying the project	Revenue share dispute

71	PPP Seaport project	IMC Ltd (Kandla Port Trust)	Authority blamed the operator of not paying revenue share as per contract terms while the contractor blamed the authority in failing in its obligation to provide rail connect and water depth in given time frame delaying the project	Revenue share dispute
72	PPP Seaport project	Sterlite Ports Ltd.(Visakhapatnam Port)	The conflict between authority and developer on contractual issues which may lead to project cancellation	Contractual Dispute
73	PPP Seaport project	ALBA Asia Pvt Ltd(Visakhapatnam Port)	The conflict between authority and developer on contractual issues which may lead to project cancellation	Contractual Dispute
74	PPP Seaport project	Vizag Seaport	The conflict between authority and developer on contractual issues which may lead to project cancellation	Contractual Dispute
75	PPP Seaport project	Adani Ports andSEZ(Visakhapatnam Port	The conflict between authority and developer on contractual issues which may lead to project cancellation	Contractual Dispute

Appendix E: Financial returns of operational PPP projects in terms of NPV and IRR calculated using the financial model

1) NHAI TOLL ROADS

Sr.No.	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	Ashoka Sambalpur Bargarh Tollway	-630	-1142	-5	-15	10.88	14.24	-15.88	-29.24
2	Badarpur Faridabad Expressway	-268	-548	-6	-20	7.5	8.76	-13.5	-28.76
3	ATR Infrastructure Private Limited	168	65	10	8	10.75	14.24	-0.75	-6.24
4	GMR Ambala Chandigarh Expressways	-183	-471	-3	-10	12.88	16.65	-15.88	-26.65
5	GMR Hyderabad Vijayawada Expressways	753	-896.00	3	-5	9.03	10.81	-6.03	-15.81
6	GMR OSE Hungund Hospet Highway	26	-682	0	-13	9.02	10.77	-9.02	-23.77
7	IRB Pathankot Amritsar Toll Road	-187	-668	-1	-8	10.01	13.05	-11.01	-21.05

8	Lanco Devihalli Highways	-122	-380	-2	-8	11.17	14.63	-13.17	-22.63
9	Salem Tollways Limited	-415	-599	-10	-20	14.42	18.05	-24.42	-38.05
10	Tirchy Thanjavur Expressways Limited	113	-34	4	-3	8.8	10.38	-4.8	-13.38
11	TK Toll Road	-356	-594	-5	-12	13.4	17.24	-18.4	-29.24
12	Guna Bypass Road	132	75	17	25	8.67	9.84	8.33	15.16
13	IVRCL Chengapalli Tollways	-266	-752	-2	-10	8.93	10.48	-10.93	-20.48
14	IRB Tumkur Chitradurga Tollway	3046	749	15	16	9.88	21.58	5.12	-5.58
15	IRB Surat Dahisar Tollway	567	-366	0	-3	12.2	15.94	-12.2	-18.94
16	Ashoka Highways Bhandara	206	-150	3	-4	10.67	14.06	-7.67	-18.06
17	Bangalore Elevated Tollway	1132	938	13	15	10.48	13.85	2.52	1.15
18	GMR Jadcherla Expressways	289	-142	5	-4	10.1	13.26	-5.1	-17.26
19	L & T Devihalli Hasan Tollway	-173	-328	-3	-7	14.77	20	-17.77	-27
20	L & T Vadodara Bharuch Tollway	1372	483	9	7	8.69	9.92	0.31	-2.92
21	TD Toll Road	-139	-378	-2	-9	12.28	16.09	-14.28	-25.09
22	Rohtak Panipat Tollway	-70	-886	-1	-12	9.83	12.06	-10.83	-24.06
23	IRB Pathankot Amritsar Toll Road	-187	-668	-1	-8	10.01	13.05	-11.01	-21.05
24	Pondicherry Tindivanam Tollway	-65	-286	-1	-8	10.39	13.63	-11.39	-21.63
25	Ashoka Belgaum Dharwad Tollway	262	-112	0	0	9.71	12.5	-9.71	-12.5
26	Ashoka Highways Durg Ltd	-283	-163	-5	-4	9.81	14.09	-14.81	-18.09
27	Baharampore Farakka Highways	-213	-679	-2	-11	9.23	15.16	-11.23	-26.16
28	BSCPL Godhra Tollways Limited	257	-257	3	-4	13.38	13.54	-10.38	-17.54
29	DS Toll Road Limited	1006	597	16	18	9.13	11.35	6.87	6.65
30	GMR Ulundurpet Expressways	54	-533	1	-9	10.33	13.62	-9.33	-22.62
31	Guruvayoor Infrastructure	426	-35	6	-1	9.22	11.57	-3.22	-12.57
32	GVK Deoli-Kota Expressway	177	-538	2	-11	9.93	12.33	-7.93	-23.33
33	GVK Jaipur-Kishangarh Expressway	1356	1219	6	10	8.41	9.22	-2.41	0.78

34	IDAA Infrastructure	189	-832	2	-20	8.53	9.69	-6.53	-29.69
35	IRB Jaipur Deoli Tollway	-543	-613	-3	-7	10.66	14.07	-13.66	-21.07
36	JAS Toll Road Company	297	155	11	9	10.39	13.74	0.61	-4.74
37	L&T Western Andhra Tollways	421	111	7	3	9.44	12.07	-2.44	-9.07
38	L&T Krishnagiri Thopur Toll Road	947	817	10	10	8.71	9.99	1.29	0.01
39	Madurai Tutikorin Expressway	332	-274	4	-7	9.15	10.96	-5.15	-17.96
40	Dhule Palesner Tollway	658	-86	5	-1	9.48	12.23	-4.48	-13.23
41	Pune-Solapur Expressway	764	-1058	4	-1	9.36	12.04	-5.36	-13.04
42	Hyderabad Yadgiri Tollway	473	86	7	2	9.42	11.87	-2.42	-9.87
43	JR Toll Road	-107	-393	-2	-20	9.28	11.53	-11.28	-31.53
44	Soma-Isolux-Kishangarh-Ajmer-Beawar Tollway	-158	-298	-3	-10	14.35	17.91	-17.35	-27.91
45	Narmada Infrastructure Construction	296	147	21	13	11.02	14.41	9.98	-1.41
46	L&T Western India Tollbridge Limited	28	-39	8	-1	10.53	13.54	-2.53	-14.54
47	Trichy Tollways	777	-66	6	-1	9.48	12.14	-3.48	-13.14
48	Talegaon Amravati Tollways	1740	-412	11	-10	12.98	9.07	-1.98	-19.07
49	MVR Infrastructure & Tollways	343	11	6	0	12.62	10.51	-6.62	-10.51
50	Lanco Hoskote Highway	-390	-825	-5	-17	9.01	11.96	-14.01	-28.96
51	L&T Panipat Elevated Corridor	-43	-697	-1	-13	8.41	9.13	-9.41	-22.13
52	West Gujarat Expressway	176	-4	5	0	11.79	15.48	-6.79	-15.48
53	Brij Bhoomi Expressway	45	-45	0	-8	10.72	8.3	-10.72	-16.3
54	Wainganga Expressway	-83	-193	-3	-15	10.47	13.5	-13.47	-28.5
55	Mumbai Nasik Expressway	811	307	11	10	8.99	10.97	2.01	-0.97
56	TN (DK) Expressways	116	-70	4	-4	9.17	11.44	-5.17	-15.44
57	KNR Walayar Tollways	-562	-734	-10	-20	12.44	16.35	-22.44	-36.35
58	Baleshwar Kharagpur Expressway	-540	-490	-6	-10	10.72	14.21	-16.72	-24.21
59	Ircon Soma Tollway	667	316	9	6	12.46	16	-3.46	-10
60	Kurukshetra Expressway	353	-75	4	-2	10.28	13.12	-6.28	-15.12

61	Swarna Tollway	1805	1227	12	13	9.96	13.08	2.04	-0.08
62	Oriental Pathways Indore	482	-35	6	-1	9.64	12.47	-3.64	-13.47
63	Khed Sinnar Expressway	-293	-1239	-2	-16	10.67	13.86	-12.67	-29.86
64	Ghaziabad Aligarh Expressway Pvt. Ltd.	1094	-721	4	-6	10.52	13.62	-6.52	-19.62
65	Oriental Pathways (Agra)	80	-41	4	-3	11.67	15.37	-7.67	-18.37

2) NHAI ANNUITY ROADS

Sr.No.	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	PNC Raebareli Highways	182	-148	3	-9	8.61	10	-5.61	-19
2	Adilabad Expressway	283	-76	7	-4	8.84	9.53	-1.84	-13.53
3	Andhra Expressway Limited	412	185	16	26	8.5	9.38	7.5	16.62
4	GMR Tambaram-Tindivanam Expressways	611	177	13	10	9.01	11.19	3.99	-1.19
5	GMR Tuni Anakapalli Expressways	340	-297	9	-20	8.84	10.7	0.16	-30.7
6	Jorabat Shillong Expressway	29	-512	0	-17	9.25	11.23	-9.25	-28.23
7	Malaxmi Highways	136	-26	8	-6	8.99	10.36	-0.99	-16.36
8	Nirmal BOT Limited	340	90	13	16	8.98	10.3	4.02	5.7
9	North Karnataka Expressway	835	264	13	10	10.36	12.94	2.64	-2.94
10	Patel-KNR Infrastructure	701	-81	46	-4	8.53	11.97	37.47	-15.97
11	Rajahmundry Expressway Ltd.	335	99	13	16	8.8	10.35	4.2	5.65
12	Rohan Rajdeep Toll Roads Private Limited	206	67	11	9	9.49	12.03	1.51	-3.03
13	Shillong Expressway Limited	128	4.2	8	1	10.13	12.82	-2.13	-11.82
14	Andhra Pradesh Expressway Limited	549	33.73	7	1	10.05	13.18	-3.05	-12.18
15	Gayatri Lalitpur Roadways Limited	54	-139	2	-11	9.07	11.19	-7.07	-22.19
16	GMR Pochanpalli Expressways	679	170	0.1	6	9.05	11.13	-8.95	-5.13
17	Gorakhpur Infrastructure Company	248	106	9	11	8.84	10.08	0.16	0.92

18	Gwalior Bypass Project Limited	16	-377	0	-14	9.06	10.65	-9.06	-24.65
19	Khagaria Purnea Highway Project Ltd.	263	-52	5	-5	8.12	9.95	-3.12	-14.95
20	L&T Interstate Road Corridor Limited	395	-15	8	-1	8.79	10.34	-0.79	-11.34
21	Mokama-Munger Highway Limited	156	1887	8	20	8.87	10.22	-0.87	9.78
22	NYSE Infrastructure Private Limited	137	-191	8	-20	9.18	11.58	-1.18	-31.58
23	O B Infrastructure	314	-58	6	-3	7.84	10.82	-1.84	-13.82
24	Patel KNR Heavy Infrastructure	378	101	7	5	7.62	9.03	-0.62	-4.03
25	Ranchi Hazaribagh Expressway Limited	377	-111	6	-5	9.29	11.56	-3.29	-16.56
26	Essel Lucknow-Raebareli Toll Roads	157	-15	4	-1	8.06	8.41	-4.06	-9.41

3) STATE ROADS

SR NO	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	Noida Toll Bridge Company Ltd	907	317	8	4	10.68	13.89	-2.68	-9.89
2	DBL Bankhlafata Dogawa Tollways	89	26	10	8	9.22	8.83	0.78	-0.83
3	Atlanta Ropar Tollways	72	-10	8	-2	8.91	10.95	-0.91	-12.95
4	DBL Betul Sarni Tollways Limited	312	172	15	49	8.4	8.91	6.6	40.09
5	DBL Sardarpur Badnawar Tollways	11.8	-35	2	-11	9.45	12.11	-7.45	-23.11
6	Esslel Mhow Ghatabillod Toll Roads	-59	-145	-4	-17	8.99	11.52	-12.99	-28.52
7	L&T Halol Shamlaji Tollway Limited	-537	-1181	-6	-17	13.84	11.62	-19.84	-28.62
8	Rajahmundry Godavari Bridge Limited	-505	-775	-5	-12	11.52	15.18	-16.52	-27.18
9	Rewa Pathways	26.22	9.97	10	8	11	14.43	-1	-6.43
10	Viva Highways Limited	415	282	18	20	8.72	14	9.28	6
11	AAP Infrastructure	124	73	12	12	12.43	10.38	-0.43	1.62
12	Aryan Toll Road Private	17.98	-76	3	-12	11.46	15.12	-8.46	-27.12
13	Chetak Mitra Tollway	40	4	6	1	9.33	12.17	-3.33	-11.17
14	Cyberabad Expressways	160	-2	7	0	9.7	12.37	-2.7	-12.37
15	DBL Silwani Sultanganj Tollways Limited	74	12	7	3	9.75	12.86	-2.75	-9.86

16	Dinara Dhatia D.P. Jain Pathways	20	11	19	30	10.81	14.11	8.19	15.89
17	Essel Sagar-Damoh Toll Roads Limited	36	-45	3	-8	10.16	13.42	-7.16	-21.42
18	Fekari Infrastructure Private Limited	21	-9	7	-7	7.76	9.45	-0.76	-16.45
19	GVRMP Dharwad Ramanagar Tollway	42	-99	1	-5	11.61	15.32	-10.61	-20.32
20	Hyderabad Expressway	30	-60	2	-6	12.41	16.21	-10.41	-22.21
21	Hyderabad Ring Road Project Private Limited	230	-246	13	-15	12.45	16.25	0.55	-31.25
22	Kalthia Infra-con Private Limited	75	26	24	21	9	11.54	15	9.46
23	Kalyan Sangam Infratech Ltd.	-35	-225	-1	-12	8.68	10.35	-9.68	-22.35
24	L&T Ahmedabad Maliya Tollway Limited	701	-305	4	-3	8.55	9.28	-4.55	-12.28
25	L&T Rajkot Vadinar Tollway Limited	123	-386	1	-6	8.89	10.97	-7.89	-16.97
26	Maharashtra Border Check Post Network	996	-360	7	-3	9.22	11.76	-2.22	-14.76
27	N.A.M Expressway	-5	-724	0	-9	10.98	15.52	-10.98	-24.52
28	NSP BVSR KP Road Projects Pvt. Ltd.	75	48	18	24	11.61	15.32	6.39	8.68
29	PNC Bareilly Nainital Highway	-79	-306	-1	-10	8.7	10.87	-9.7	-20.87
30	SEW Bellary Highways	43	-35	5	-13	9.85	12.13	-4.85	-25.13
31	Ujjayini Highways	70	12	7	3	11.3	14.87	-4.3	-11.87
32	Valecha LM Tollway	38	-137	1	-6	9.29	11.54	-8.29	-17.54
33	Western MP Infrastructure and Toll Roads	1374	668	11	10	7.88	9.79	3.12	0.21
34	Aurangabad Jalna Tollway	343	81	8	3	10.49	13.79	-2.49	-10.79
35	Bhilwara Jaipur Toll Private Limited	120	22	6	3	11.01	14.94	-5.01	-11.94
36	Dewas Bhopal Corridor	694	321	14	21	7.39	8.11	6.61	12.89
37	East Hyderabad Expressway Limited	379	-33	14	-2	10.46	13.75	3.54	-15.75
38	Essel Sagar Damoh Toll Roads (jabalpur)Limited	-97	-225	-5	-20	10.38	13.65	-15.38	-33.65
39	GF Toll Road	-142	-523	-2	-16	9.47	12.27	-11.47	-28.27
40	GVR Panna Amanganj Tollway	82	37	10	12	9.02	11.58	0.98	0.42
41	Kalyan Infratech	28	-149	1	-11	11.84	15.54	-10.84	-26.54
42	MSK Infrastructure and Toll Bridge Limited	2.7	-17.16	1	-7	14.13	17.75	-13.13	-24.75
43	Ramky Elsamex Hyderabad Ring Road	95	-25	5	-3	8.33	10.78	-3.33	-13.78

44	Sikar Bikaner Highway	-709	-715	-13	-20	14.27	18.23	-27.27	-38.23
45	Supreme Manor Wada Bhiwandi Infrastructure	98	-198	2	-6	9.4	11.85	-7.4	-17.85
46	Transstroy Bhopal Bypass Tollway	20	-118	1	-13	10.77	14.06	-9.77	-27.06
47	TRDCL -Phase I	10.47	-60	1	-17	10.04	13.21	-9.04	-30.21
48	Vindyachal Expressway	14	-283	0	-5	9.69	11.61	-9.69	-16.61
49	GMR Chennai Outer Ring Road	-100	-431	-1	-16	9.76	12.59	-10.76	-28.59
50	Jaora-Nayagaon Toll Road Company	1311	755	13	21	7.38	8.06	5.62	12.94

4) AIRPORTS

SR NO	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	Bangalore International Airport Limited	29609	11532	14	16	8.72	10.35	5.28	5.65
2	Delhi International Airport Limited	26601	8176	12	4	9.45	12.2	2.55	-8.2
3	Cochin International Airport Limited	4378	3141	23	17	20.25	22.12	2.75	-5.12
4	GMR Hyderabad International Airport Limited	32182	18199	13	13	8.48	9.62	4.52	3.38
5	Mumbai International Airports Private Limited	36262	8692	13	3	12.65	9.55	0.35	-6.55

5) SEA PORTS

SR NO	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	Krishnapatnam Port Company Limited	8157	3694	8	7	8.64	9.69	-0.64	-2.69
2	Vizag Seaport	428	311	8	6	9.76	12.74	-1.76	-6.74
3	Adani Murmugao Port Terminal	-167	-325	-4	-12	10.58	13.95	-14.58	-25.95

4	Adani Petronet (Dahej) Port Private Limited	3691	2047	21	16	10.17	13.26	10.83	2.74
5	Chettinad International Coal Terminal	1101	670	19	34	9	10.41	10	23.59
6	Ennore Tank Terminal	551	113	9	4	9.6	12.39	-0.6	-8.39
7	Gangavaram Port	3525	1449	11	7	8.57	9.93	2.43	-2.93
8	IMCOLA Cranes	0.48	-16	0	-18	9.23	11.71	-9.23	-29.71
9	Visakha Container Terminal Limited	817	698	7	9	8.67	9.83	-1.67	-0.83
10	Vizag General Cargo berth Pvt. Ltd.	1769	1021	13	12	8.65	8.65	4.35	3.35
11	Adani Vizag Coal Terminal	-116	-302	-3	-11	8.94	11.41	-11.94	-22.41
12	Chettinad International Coal Terminal	1089	791	19	33	9	10.41	10	22.59
13	Gateway Terminals India Private Limited	36.5	-1588	0	-12	10.04	13.22	-10.04	-25.22
14	Gujarat Pipavav Port	3480	15013	6	0	10.32	13.11	-4.32	-13.11
15	Hazira LNG Ltd	9185	6417	23	39	9.32	11.91	13.68	27.09
16	Karaikal Port	-75	-1489	0	-7	10.47	13.83	-10.47	-20.83
17	South India Corporation	-376	-681	-5	-11	10.73	10.73	-15.73	-21.73
18	South West Port	2522	1935	14	14	7.54	9.83	6.46	4.17

6) METRO PROJECTS

SR NO	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	L&T Metro Rail Hyderabad	16974	-12829	4	-3	9.44	10.67	-5.44	-13.67
2	Mumbai Metro One Private Limited	-698	-3434	-1	-8	7.4	8.16	-8.4	-16.16
3	Rapid MetroRail Gurgaon South Limited	2577	-15791	0	-4	11.52	15.18	-11.52	-19.18

7) RENEWAL ENERGY PROJECTS

SR NO	Name of SPV	Project NPV	Equity NPV	Project IRR (%)	Equity IRR	WACC	Cost of equity	Project IRR-WACC	Equity IRR-Cost of Equity
1	Himamchal Baspa Power co ltd	9710	-155	8	0	8.67	10.3	-0.67	-10.3

2	Malana Power Company Limited	1304	577	24	17	13.17	17.27	10.83	-0.27
3	Mahalaxmi Vidyut Private Limited	270	153	25	24	12.88	9.93	12.12	14.07
4	AD hydro Power Corporation Limited	8572	4034	11	8	12.63	9.36	-1.63	-1.36

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